PROC. ENTOMOL. SOC. WASH.
102(1), 2000, pp. 21–49

REVISION OF *LOBOGENESIS* RAZOWSKI AND *ODONTHALITUS* RAZOWSKI (LEPIDOPTERA: TORTRICIDAE: TORTRICINAE), WITH COMMENTS ON THEIR MONOPHYLY

JOHN W. BROWN

Systematic Entomology Laboratory, PSI, Agricultural Research Service, U.S. Department of Agriculture, % National Museum of Natural History, Washington, DC 20560-0168, U.S.A (e-mail: jbrown@sel.barc.usda.gov)

Abstract.—The Neotropical tortricid genera *Lobogenesis* Razowski and *Odonthalitus* Razowski are revised. Eight species are included in *Lobogenesis*: *L. lobata* Razowski (type species) from Costa Rica and Panama; ***L. penai*, new species,** from Cochabamba, Bolivia; ***L. magdalenana*, new species**, from Colombia and Venezuela; ***L. larana*, new species,** from Lara Province, Venezuela; ***L. contrasta*, new species,** from Cochabamba, Bolivia; ***L. antiqua*, new species,** from Cochabamba, Bolivia; ***L. peruviana*, new species,** from Peru; and ***L. varnicosa*, new species,** from Argentina. Nine species are included in *Odonthalitus*: *O. lacticus* Razowski (type species) from Durango, Mexico; ***O. bisetanus*, new species,** from Oaxaca, Mexico; ***O. improprius*, new species,** from Oaxaca, Mexico; ***O. conservanus*, new species,** from Jalisco, Mexico; *O. orinoma* (Walsingham), **new combination,** from Guerrero, Mexico; ***O. fuscomaculatus*, new species,** from Michoacan, Mexico; ***O. poas*, new species,** from Alajuela Province, Costa Rica; ***O. viridimontis*, new species,** from Puntarenas Province, Costa Rica; and *O. regilla* (Walsingham), **new combination,** from Guatemala. While the monophyly of *Lobogenesis* is well supported by characters of the male and female genitalia, *Odonthalitus,* as currently defined, may be paraphyletic with respect to *Lobogenesis.*

Key Words: Phylogeny, systematics, South America, Central America, *Anopina,* Euliini, new species, genitalia

Razowski (1992) proposed *Odonthalitus* to accommodate the single species *O. lacticus* Razowski, described from two specimens (1 ♂, 1 ♀) collected in Durango, Mexico. In the same paper, he described the monotypic genus *Lobogenesis* for the new species *L. lobata* Razowski, represented by a single male from Costa Rica. Although the male genitalia are moderately divergent, these two monotypic genera share a variety of morphological features and are nearly identical in facies. During the course of continued studies on the systematics of the New World Euliini, I discovered numerous undescribed and two described (misplaced) species that are morphologically and superficially similar to these two genera, stimulating an assessment of the phylogenetic relationship between the two genera and descriptions of the new species. A phylogenetic hypothesis based primarily on structures of the male and female genitalia indicates that while *Lobogenesis* is monophyletic, its separation from *Odonthalitus* may leave the latter paraphyletic.

Although similar in facies to *Anopina* Obraztsov, the male and female genitalia of *Odonthalitus* and *Lobogenesis* are highly

divergent from all other Euliini, with a bifurcate uncus in the male and greatly reduced apophyses anteriores in the female. The subbasal attachment of the socius and the free (unjoined) distal arms of the gnathos of *Lobogenesis* are reminiscent of some Sparganothini. However, these character states are unlikely to be homologous with those found in Sparganothini, as the two groups have little else in common. Some females of *Odonthalitus* have bilobed papillae anales reminiscent of those found in some species of *Apotoforma* Busck (Tortricini) (see Razowski 1984, 1993); the greatly reduced apophyses anteriores also are similar in the two. However, because the groups share no other derived character states and male genitalia of the two are highly divergent, these similarities in female genitalia are suspected to represent convergence rather than evidence of common ancestry. If the bilobed papillae anales and greatly reduced apophyses eventually are demonstrated to be homologous between *Odonthalitus* and *Apotoforma*, it would provide evidence for the placement of *Odonthalitus* and *Lobogenesis* in Tortricini rather than Euliini.

The purposes of this paper are to describe 7 new species of *Lobogenesis* and 6 new species of *Odonthalitus*, propose two new combinations in *Odonthalitus*, present a hypothesis of the phylogenetic relationships among the species, and modify the descriptions of the genera based on the new taxa.

Materials and Methods

Specimens (n = 90) were obtained from the following institutions: The Natural History Museum (BMNH), London, England; Instituto Nacional de Biodiversidad (INBio), Santo Domingo, Heredia, Costa Rica; San Diego Natural History Museum (SDNHM), San Diego, California, U.S.A.; Essig Museum of Entomology, University of California, Berkeley (UCB), U.S.A; National Museum of Natural History (USNM), Smithsonian Institution, Washington, D.C., U.S.A.

Dissection methodology follows that summarized in Brown and Powell (1991). Illustrations of genitalia were drawn with a camera-lucida attachment on a dissecting microscope. Forewing measurements were made with an ocular micrometer mounted in a dissecting microscope. Terminology for wing venation and genitalic structures follows Horak (1984). Abbreviations and symbols are as follows: FW = forewing; HW = hindwing; DC = discal cell; n = number of specimens examined; ca. (circa) = approximately; $\bar{x}$ = mean. Upper side refers to dorsal surface of wings, under side to ventral surface. Because most species are extremely similar in facies, not all are illustrated. In contrast, male and female genitalia are diagnostic and are illustrated for each species. Dissections of the genitalia are required for accurate species determinations, and comparison with the illustrations is the best means for identifying specimens.

Phylogeny

A phylogenetic analysis was conducted on the 17 taxa recognized as species (plus a putative out-group—*Anopina* Obraztsov). The analysis was based on 23 morphological characters, 15 binary and 8 multi-state, that vary among the species of *Lobogenesis* and *Odonthalitus*, and exhibit shared, derived states at the species level. These include 1 character of the head, 2 characters of the thorax, 15 characters of the male genitalia, and 5 characters of the female genitalia. Character state polarity was determined using the out-group method. Because sister group relationships are poorly understood within Euliini (e.g., Brown and Powell 1991), selection of an out-group was somewhat arbitrary. The genus *Anopina* Obraztsov was chosen because of its similar forewing pattern and long antennal cilia in the male. Horak's (1984) assessment of taxonomically significant structures in Tortricinae was used for determination of character state polarity for characters that could not be determined convincingly using the

out-group (e.g., uncertain homology, both states present in out-group). The characters, along with their putative plesiomorphic and apomorphic conditions, are presented in Table 1. The distribution of the character states among the 17 taxa and the out-group is presented in Table 2; "?" is used where the character state is unknown (e.g., characters for species represented by a single sex).

The data set was subjected to parsimony analysis using Hennig86 version 1.5 (Lipscomb 1994), employing the "mhennig*" command. This algorithm constructs trees, each by a single pass through the data, by adding the taxa in a different sequence each time, and then applies branch-swapping to each of the trees. The analysis generated 6 equally parsimonious trees with a length of 48, a consistency index of 0.75, and a retention index of 0.85. Because over half of the taxa (n = 9) are represented by a single sex, there is a considerable amount of missing data, which resulted in the equivocal placement of several taxa.

The cladogram illustrated in Fig. 1 represents the "majority rule" consensus tree (see Lipscomb 1994) and is identical to one of the six trees. It is considered the best working hypothesis of the phylogeny of the species. The analysis demonstrates that the monophyly of *Lobogenesis* is well supported (i.e., in all 6 trees), while *Odonthalitus*, as current defined, may be paraphyletic (i.e., in all 6 trees). The hypothesis of the phylogeny is fairly concordant with the geographic distribution of the two genera: with the exception of *L. lobata* (from Costa Rica and Panama), *Lobogenesis* appears to be restricted to South America, while *Odonthalitus* is entirely Central American (including northern Mexico) in distribution.

Superficially adults of *Odonthalitus* are indistinguishable from those of *Lobogenesis*. Synapomorphies for the two include the forewing pattern, loss of the male foreleg hairpencil, elongate cilia of the male antenna, bifurcate uncus, and reduced apophyses anteriores. The monophlyly of *Lobogenesis* is supported convincingly by the following: uncus bifurcations long, slender, and attenuate apically; gnathos arms free distally or only weakly attached by membrane; socius large, subbasally attached, with dorsal lobe; and linear row of tiny spinelike teeth in apical region of valva. In contrast, *Odonthalitus* was portrayed as paraphyletic in each of the 6 trees.

There are at least three possible ways to resolve the paraphyly. One solution would be to consider the entire clade as a single genus to which either *Odonthalitus* or *Lobogensis* could be applied (based on the choice of the first revisor). Another would be to include *lacticus* and *regilla* with the species considered *Lobogenesis* in Fig. 1, which would result in the synonymy of *Lobogenesis* with *Odonthalitus*, and to describe a new genus for the remaining Central American species. The third would be to maintain *Lobogenesis* as shown in Fig. 1, restrict *Odonthalitus* to the species *lacticus* and *regilla*, and propose a new genus for the remaining Central American species. However, for the present the generic status of both *Lobogensis* and *Odonthalitus* are retained for a number of reasons. First, the extremely long, slender aedeagus of *regilla* and the notched papillae anales of *lacticus* are extremely similar to those of *O. viridimontis* and *O. poas*, suggesting a closer phylogenetic relationship of these species than is portrayed in the cladogram. Secondly, from a biogeographic perspective, one would expect *lacticus* and *regilla* (both from Mexico) to be more closely allied to *Odonthalitus* than to *Lobogenesis*. Finally, because the data set for the analysis contains so much missing data (i.e., several species are represented by a single sex), any classification based on the results of the parsimony analysis likely would be inherently unstable. Hence, a conservative approach is employed that maintains the stability of the generic nomenclature of the group.

Table 1. Characters for phylogenetic analysis of *Odontlialitus* and *Lobogenesis*; 0 = plesiomorphic state, 1–3 = apomorphic states; figure references to apomorphic condition(s), where illustrated.

1. Head	0—length of male antennal cilia equal to width of flagellomere
	1—length of male antennal cilia 3 times width of flagellomere
2. Thorax	0—male foreleg hairpencil present
	1—male foreleg hairpencil absent
3. Forewing	0—pattern variable
	1—pattern with distinctive costal and basal patch
4. Uncus	0—unmodified, without bifurcate distal portion
	1—bifurcate in distal one-half (Figs. 2–8)
	2—bifurcate from base (Figs. 14–18)
	3—bifurcations widely separate at base (Figs. 19–20)
5. Uncus	0—tips of bifurcation round or blunt
	1—tips of bifurcation narrowed and pointed (Figs. 2–5)
	2—tips with narrow triangular enlargement (Figs. 6–8)
6. Gnathos	0—gnathos arms joined distally
	1—gnathos arms weakly joined distally (Figs. 14–16)
	2—gnathos arms separate distally (Figs. 2–8, 19–20)
7. Gnathos	0—arms without lateral process(es)
	1—arms with lateral lobes (Figs. 17–18)
8. Socius	0—simple, small, slightly digitate
	1—large, with moderate dorsal lobe (Figs. 2–5)
	2—huge, with large dorsal lobe (Figs. 6–8)
9. Transtilla	0—simple bridge
	1—lost (Figs. 17–20)
10. Valva	0—simple at base
	1—with patch of curved spines at base of costa (Figs. 14–15)
	2—with large hook at base of casta (Fig. 16)
	3—costa with free hairy lobe near middle (Figs. 17–8)
11. Valva	0—costa simple
	1—costa with free flange ca. 0.67 distance from base (Figs. 3–5)
	2—flange enlarged (Fig. 4)
12. Valva	0—simple
	1—dense patch of setae in middle of basal one-third (Figs. 4, 6–8)
13. Valva	0—simple
	1—curved, sclerotized line from patch of setae to apex (Figs. 6–8)
14. Valva	0—apex more or less rounded
	1—apex attenuate, somewhat pointed (Figs. 14–18)
15. Valva	0—unmodified
	1—linear row of tiny spinelike teeth in apical region (Figs. 2–8)
16. Valva	0—simple
	1—with notch at venter (Figs. 19–20)
17. Aedeagus	0—simple, unmodified
	1—somewhat undulate (Figs. 3–5)
	2—strongly bent, somewhat "J" shaped (Figs. 14–16)
18. Aedeagus	0—simple, unmodified
	1—extremely long, slender (Figs. 17–19)
19. Sterigma	0—simple
	1—with scobinate lateral patches (Figs. 21–22)
20. Sterigma	0—simple
	1—rounded or v-shaped notch at ostium (Figs. 9, 12)
21. Sterigma	0—simple
	1—with sclerotized arch surrounding ostium (Figs. 10–11, 13)
22. Papillae	0—simple, parallel-sided
	1—with a mesal notch (Figs. 23–25)
23. Apophyses ant.	0—unmodified, moderately long
	1—reduced in length (Figs. 21–22)
	2—reduced to a short nub (Figs. 9–13, 25–26)
	3—lost (Figs. 23–24)

Table 2. Distribution of character states among species; see Table 1 for explanation of character states (? = missing data).

Outgroup	0000	0000	0000	0000	0000	000
lacticus	1113	0200	1000	0101	0000	012
regilla	1113	0200	1000	0001	01??	???
poas	1111	0010	1300	0100	0100	013
viridimontis	1111	0010	1300	0100	0100	013
orinoma	??1?	????	????	????	??00	002
fuscomaculatus	??1?	????	????	????	??10	001
conservanus	1112	0100	0200	0100	2010	001
bisetanus	1112	0100	0100	0100	20??	???
improprius	1112	0100	0100	0100	20??	???
contrasta	1111	2202	0001	1010	00??	???
peruviana	1111	2202	0001	1010	0000	102
antiqua	1111	?202	0001	1010	00??	???
penai	1111	1201	0000	0010	00??	???
lobata	1111	1201	0010	0010	1001	002
larana	1111	1201	0021	0010	1000	102
magdalenana	1111	1201	0010	0010	1001	002
varnicosa	??1?	????	????	????	??00	102

Systematics

Lobogenesis Razowski 1992

Lobogenesis Razowski 1992: 213; Powell et al. 1995: 144.

Type species.—*Lobogenesis lobata* Razowski 1992, by monotypy.

Redescription.—*Head:* Antennal cilia ca. 3.0 times width of flagellomere in male, ca. 0.5 times width of flagellomere in female. Labial palpus (segments II and III combined) ca. 1.5 times horizontal diameter of compound eye; segment II weakly upturned, slightly expanded distally by scaling; segment III ca. 0.4 as long as II, smooth-scaled, well exposed. Maxillary palpus rudimentary. Frons with overhanging tuft of scales. Ocelli small or absent. Chaetosema present. Proboscis present. *Thorax:* Smooth-scaled. Legs unmodified, male without foreleg hairpencil. *Forewing:* Length 2.3–2.4 times width; length of DC about 0.55 times FW length; width of DC about 0.20 DC length; CuA_2 originates about 0.60 along length of DC; all veins separate beyond DC; chorda and M-stem absent. No upraised scale tufts; male without costal fold. *Hindwing:* Sc+R and Rs closely approximate; M_3 and CuA_1 closely approximate; M-stem absent; tuft of hairlike scales along 1A+2A, originating near base of wing. *Abdomen:* Dorsal pits absent; no modified corethrogyne scaling in female. *Male genitalia:* Uncus bifurcate from a common, slender stalk; each arm slender, attenuate distally or with triangular enlargement at tip. Socius broad and long, with dorsal lobe, not fused to gnathos. Gnathos simple, non-dentate, arms narrow, separate distally. Subscaphium and hami absent. Transtilla a simple band or enlarged, ill-defined bridge. Valva moderately short, slightly attenuate distally; row of tiny spinelike teeth in middle of apical region. Pulvinus absent. Vinculum complete. Juxta a sclerotized plate. Aedeagus moderately long, usually weakly undulate; phallobase simple; cornuti absent. *Female genitalia:* Papillae anales narrow. Apophyses posteriores moderately long to short; apophyses anteriores reduced to a membranous nub. Sterigma a simple sclerotized band. Ductus bursae moderately long, membranous. Corpus bursae frail, elongate, pear-shaped; spicules and signum lacking. Accessory bursa frequently present.

Diagnosis.—Superficially, adults of *Lobogenesis* are indistinguishable from those of *Odonthalitus*. The two can be separated by the following characters of the male gen-

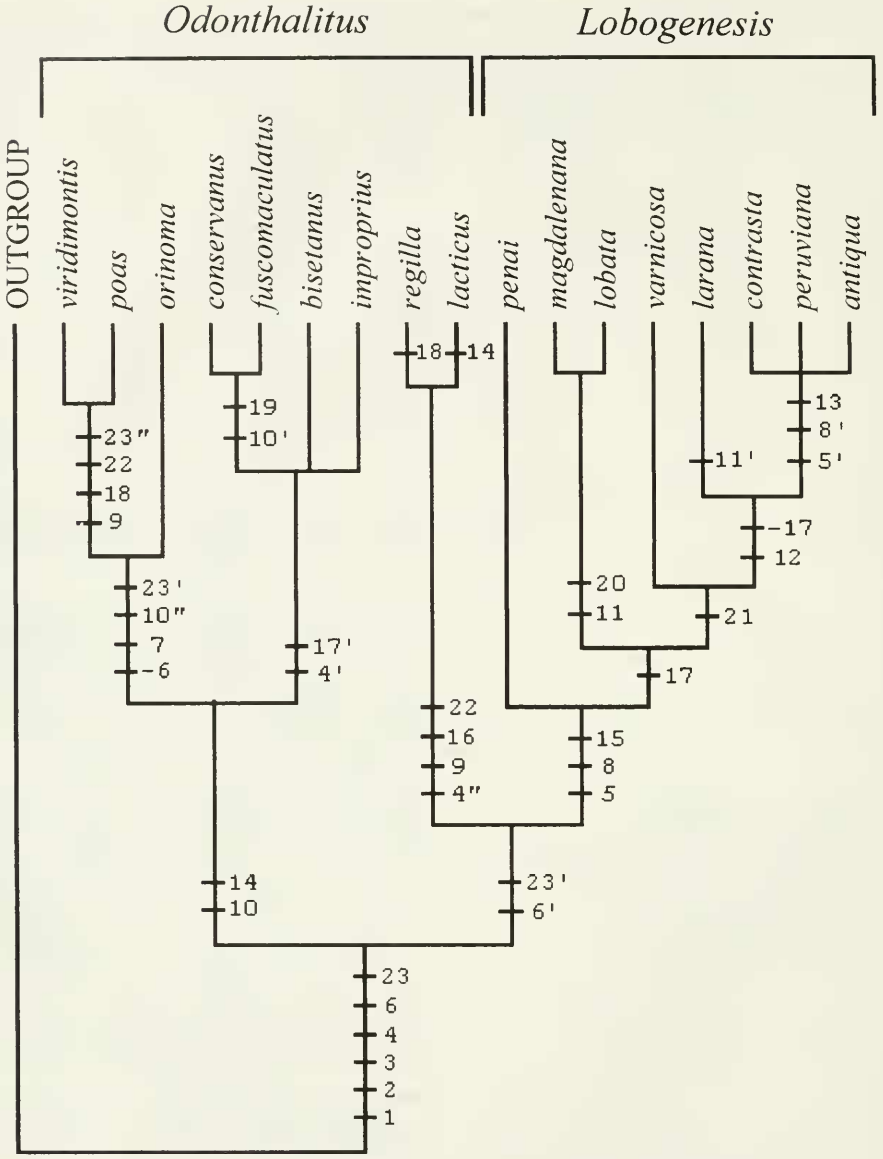


Fig. 1. Consensus cladogram of phylogeny of *Lobogenesis* and *Odonthalitus*. Prime (') and double prime (") refer to successive steps in multi-state characters; minus (−) refers to character state reversal.

italia: 1) paired uncus arms (bifurcations) always from a common stalk in *Lobogenesis,* either from a common stalk or separated basally in *Odonthalitus*; 2) distal tips of paired uncus arms (bifurcations) extremely slender, pointed or triangular distally in *Lobogenesis,* blunt or rounded in *Odonthalitus*; 3) arms of gnathos free distally in *Lobogenesis,* joined distally in *Odonthalitus,* either as a single process or weakly attached by membrane; and 4) socius attached subbasally, with a large dorsal lobe in *Lobogenesis,* socius attached basally in *Odonthalitus.*

Distribution and biology.—*Lobogenesis* is known from montane forest habitat from Costa Rica south to Argentina, from 1,100–3,000 m elevation. Adults have been col-

lected at lights. Nothing is known of the early stages. Three species are known to be sympatric in Bolivia (at Cochabamba) and two in Venezuela (at Rancho Grande).

Remarks.—Species of *Lobogenesis* are rare in collections; the 8 species treated below are represented by 37 specimens, 14 of which represent one species. Three species are known only from males and one only from females. Modern systematic revisions of Neotropical tortricids (e.g., Brown and Powell 1991, 2000) typically result in an increase in the number of recognized species by a factor of 3–4; the present treatment results in descriptions of 7 new species to accompany the single previously described species.

Lobogenesis penai J. Brown, new species
(Figs. 2, 32)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, pale cream; roughened above, pale cream. Labial palpus pale cream mesally, mostly brown laterally. Antennal scaling bronze. *Thorax:* Tan with dark brown tegula. *Forewing:* Length 6.8 mm (n = 1). Upper side pale cream, with irregular, pale brown striae throughout; basal 0.2 dark brown; dark brown, triangular patch bordering costa ca. 0.45–0.60 distance from base to apex. Under side nearly uniform dark tan with faint indication of upper side markings. *Hindwing:* Upper side white, with faint gray-brown mottling. Under side light gray brown with darker mottling. *Genitalia:* As in Fig. 2 (drawn from USNM slide 88523; n = 1). Uncus slender at base, bifurcate in distal 0.7, with extremely long, slender spines subapically. Socius large, hairy, with conspicuous portion dorsad of attachment. Gnathos arms extremely slender, elongate, separate distally. Transtilla large, membranous, with narrow sclerotized arch in ventral portion. Valva broadest at base, rounded apically; basal 0.5 of costa sclerotized. Aedeagus short, somewhat pistol-shaped, with a short lateral thorn; phallobase with small rounded membranous cap.

Female. Unknown.

Type.—Holotype, ♂, Bolivia, Incachaca, Cochabamba, tropical cloud forest area, 2,100 m, 27-VIII/5-IX-1956 (L. Peña, USNM).

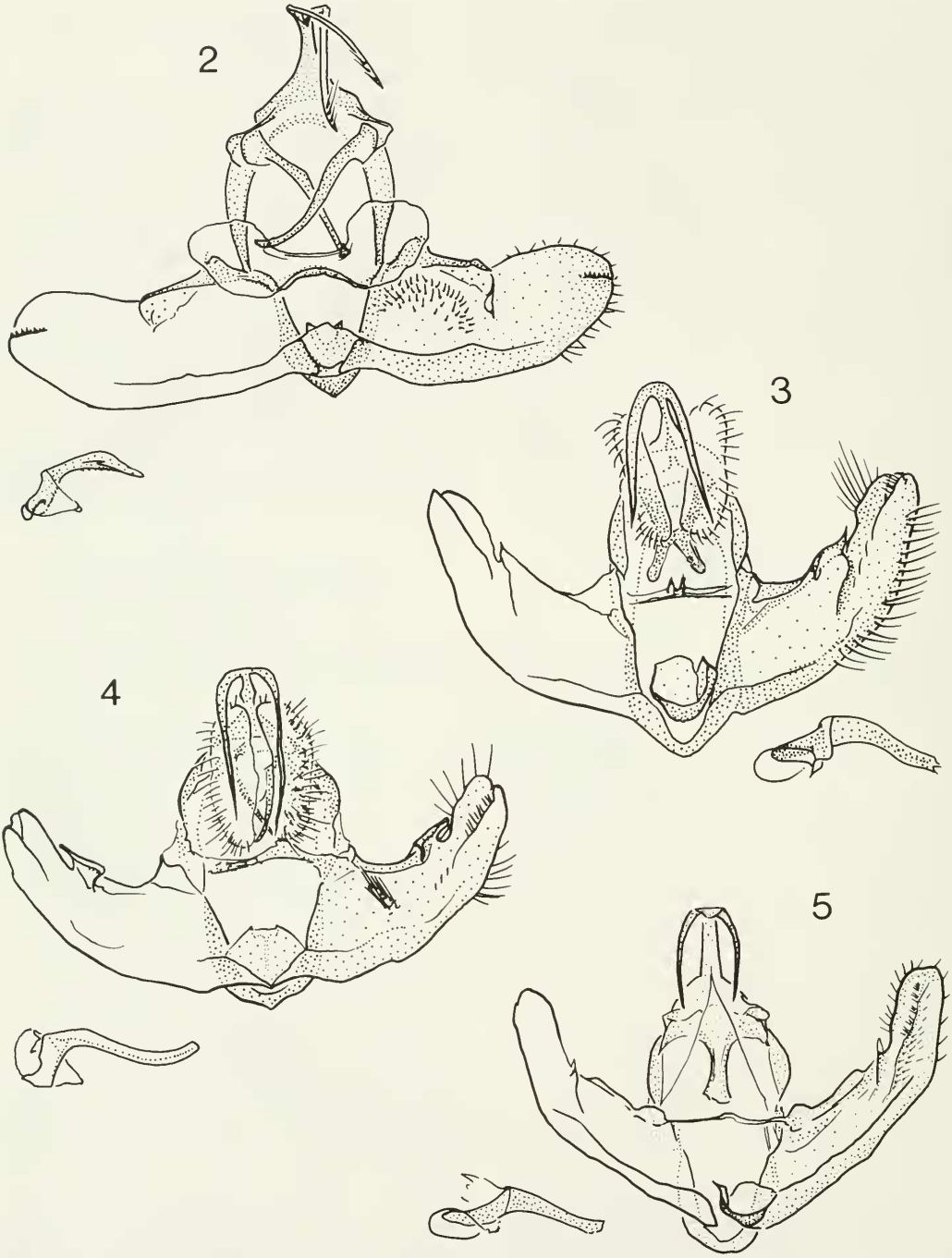
Diagnosis.—The male genitalia of *L. penai* are most similar to those of *L. larana* and *L. lobata.* They can be distinguished from those species by the much longer, more slender gnathos arms and the elongate, slender bifurcations of the uncus, with long spines subapically (Fig. 2).

Etymology.—The species name is a patronym for Louis Peña, a noted Chilean entomologist and the collector of the holotype.

Lobogenesis lobata (Razowski)
(Figs. 3, 9)

Lobogenesis lobata Razowski 1992: 215; Powell et al. 1995: 144.

Redescription.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, pale light brown; roughened above, pale tan. Labial palpus pale tan mesally, brown mixed with tan laterally. Antennal scaling brown. *Thorax:* Whitish, with brown tegula. *Forewing:* Length 5.5 mm (n = 2). Upper side whitish, with faint, sparse tan overscaling; basal 0.2 brown; brown semicircular patch bordering costa ca. 0.45–0.65 distance from base to apex; termen with irregular brown striae. Under side uniform dark tan with faint indication of upper side markings. *Hindwing:* Upper side whitish gray with slightly darker gray-brown mottling. Under side light gray-brown with darker mottling. *Genitalia:* As in Fig. 3 (drawn from USNM slide 89442, Panama; n = 2). Uncus narrow at base, bifurcate in distal 0.65, each arm slender, elongate, pointed distally. Socius with free dorsal lobe. Gnathos arms slender, weakly joined near middle, rounded distally, together forming an H-shaped process. Transtilla a narrow sclerotized band with a pair



Figs. 2–5. Male genitalia of *Lobogenesis*; valvae spread, aedeagus removed. 2, *L. penai*. 3, *L. lobata*. 4, *L. larana*. 5, *L. magdalenana*.

of dorsally projecting thorns at middle. Valva nearly rectangular, rounded apically; costa with free flange near middle; narrow sclerotized ridge across face of valva ca. 0.65 distance from base to apex; small linear patch of short, spinelike teeth in apical region. Aedeagus weakly undulate; phallobase with large, rounded, membranous cap.

Female. FW length 5.0 mm (n = 2). Superficially as in male, except thorax dark brown and antennal cilia short. *Genitalia:* As in Fig. 9 (drawn from USNM slide 88441, Panama; n = 2). Papillae anales unmodified. Apophyses posteriores moderate; apophyses anteriores extremely short, semimembranous. Sterigma a sclerotized band, with U-shaped excavation at ostium. Ductus bursae relatively long, slender, frail. Corpus bursae rounded.

Type.—Holotype, ♂, Costa Rica, Puntarenas Province, 6 km S San Vito, 20/27-IV-1967 (D. Veirs, UCB).

Additional specimens examined.—COSTA RICA: Puntarenas Province: Fca. Cafrosa, Est. Las Mellizas, P. N. Amistad, 1,300 m, 1 ♀, X-1990 (M. Ramirez & G. Mora, INBio). PANAMA: Cerro Campana, nr. Chica, 1 ♂, 2/5-IV-1965 (S. S. & W. D. Duckworth, USNM); Cerro Campana, 1 ♀, 11/14-VII-1967 (O. S. Flint, USNM).

Diagnosis.—*Lobogenesis lobata* is most similar to *L. larana* and *L. magdalenana* in several features of the male genitalia. It can be distinguished from those species by the paired thorns from the middle of the transtilla. The sexes were associated by their common occurrence at Cerro Campana.

Lobogenesis larana J. Brown, new species

(Figs. 4, 11, 33)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, whitish; roughened above, pale tan. Labial palpus whitish mesally, mostly brown laterally. Antennal scaling brown. *Thorax:* Whitish with dark brown tegula. *Forewing:* Length 5.2–5.8 mm ($\bar{x}$ = 5.4; n = 4). Upper side pale whitish, with variable, faint brown striae and reticulations, particularly dense in distal 0.5; basal 0.2 brown; brown semicircular patch bordering costa ca. 0.45–0.65 distance from base to apex; termen with irregular brown line. Under side uniform dark tan with faint indication of upperside markings. *Hindwing:* Upper side pale whitish gray with slightly darker gray-brown mottling. Under side light gray-brown with darker mottling. *Genitalia:* As in Fig. 4 (drawn from USNM slide 89444; n = 3). Uncus narrow at base, bifurcate in distal 0.65, each arm slender, pointed distally. Socius with dorsal lobe. Gnathos arms slender, separate. Transtilla a moderate, evenly sclerotized band. Valva nearly rectangular, rounded apically; an attenuate flange from costa just beyond middle, ending in free, rounded process; sacculus represented by undulate line of sclerotization; a dense patch of setae in basal 0.33 of valva; small linear patch of spinelike teeth in apical region. Aedeagus relatively slender, slightly undulate; phallobase with small membranous cap.

Female. FW length 6.5–7.0 mm ($\bar{x}$ = 6.8; n = 6). Superficially as in male, except brownish overscaling of forewing conspicuously more dense, larger average forewing length, and lacking elongate antennal cilia. *Genitalia:* As in Fig. 11 (drawn from USNM slide 87880; n = 3). Papillae anales slender, unmodified. Apophyses posteriores slender; apophyses anteriores reduced, slender, semi-membranous. Sterigma a simple band with membranous region surrounding ostium, bordered by inverted U-shaped sclerotized region. Ductus bursae moderately long. Corpus bursae oblong.

Types.—Holotype, ♂, Venezuela, Lara, Yacambu National Park, 13 km SE Sanare, cloud forest, 4,800′ [1,500 m], blacklight, 4/7-III-1978 (J. B. Heppner, USNM).

Paratypes, 3 ♂, 10 ♀. VENEZUELA: 3 ♂, 9 ♀, same data as holotype. Aragua

Province: Rancho Grande, 1,100 m, 1 ♀, 1/7-VIII-1967 (R. W. Poole, USNM).

Diagnosis.—The male genitalia of *Lobogenesis larana* are most similar to those of *L. magdalenana* and *L. lobata* (Figs. 3–5) in the overall shape of the valva, the linear patch of spinelike teeth in the apical region of the valva, and the slender bifurcations of the uncus. The three can be separated by the presence of a dense patch of setae in the basal 0.33 of the valva in *L. larana* and the mesal pair of spines from the transtilla in *L. lobata,* both features of which are lacking in *L. magdalenana.*

Remarks.—The genitalia of the female from Rancho Grande differ slightly in the shape of the sterigma from those from Yacambu.

Etymology.—The specific epithet refers to the Venezuelan province of Lara.

Lobogenesis magdalenana J. Brown, new species

(Figs. 5, 12, 30, 37)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, whitish; roughened above, pale bronze-brown. Labial palpus whitish mesally, brown mixed with tan laterally. Antennal scaling brown. *Thorax:* Brown. *Forewing:* Length 5.0 mm (n = 2). Upper side pale whitish, with faint brown striae in distal 0.5; basal 0.2 brown; brown semicircular patch bordering costa ca. 0.45–0.65 distance from base to apex. Under side uniform dark tan with faint indication of upperside markings. *Hindwing:* Upper side whitish with plae gray-brown mottling. Under side light gray-brown with darker mottling. *Genitalia:* As in Fig. 5 (drawn from BMNH slide 29065, Colombia; n = 2). Uncus narrow at base, bifurcate in distal 0.65, each arm slender, elongate, pointed distally. Socius with dorsal lobe. Gnathos arms slender, apparently joined distally by membrane. Transtilla a narrow sclerotized bridge, weakly arched mesally. Valva nearly rectangular, rounded apically; costa with roughened flange in basal 0.5; narrow sclerotized ridge across face of valva, terminating in free costal flange; linear patch of short, spinelike teeth in apical region. Aedeagus weakly undulate; phallobase with large, rounded, membranous cap.

Female. FW length 5.1–6.5 mm ($\bar{x}$ = 5.9; n = 3). Superficially as in male, except forewing length larger, forewing with brown overscaling more dense, and lacking elongate antennal cilia. *Genitalia:* As in Fig. 12 (drawn from BMNH slide 29064; Colombia; n = 3). Sterigma a sclerotized band, with membranous area surrounding ostium; ostium indicated by a sclerotized V-shaped notch. Ductus bursae moderately long. Corpus bursae oblong.

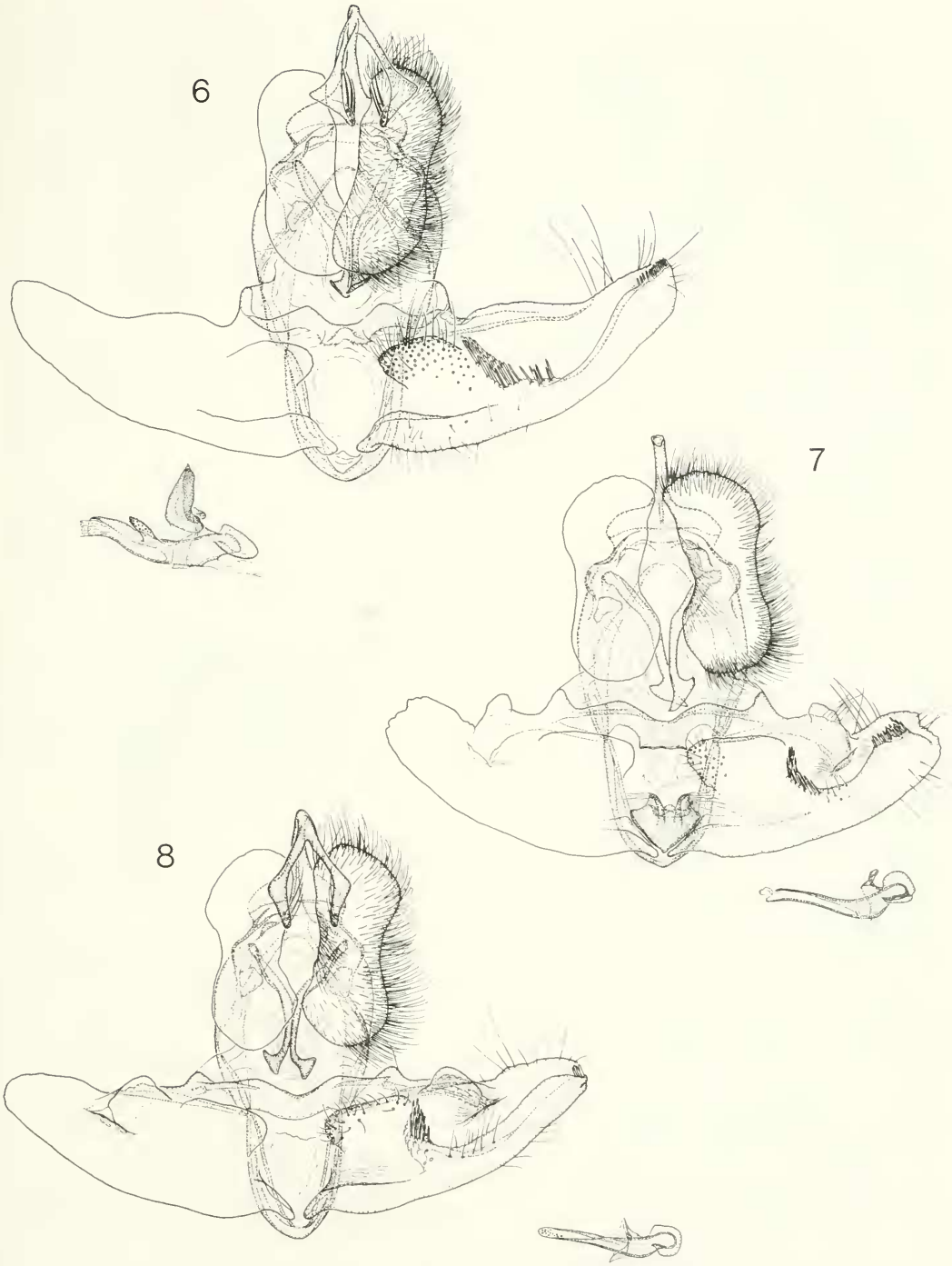
Types.—Holotype, ♂, Colombia, Magdalena, Sierra Nevada de Santa Marta, San Pedro de la Sierra, 1,500 m, 14-VIII-1973, Oxford Expedition to Colombia (BMNH).

Paratypes, 1 ♂, 2 ♀. COLOMBIA: Magdalena, Sierra Nevada de Santa Marta, San Pedro de la Sierra, 1,500 m, 1 ♀, 6-VII-1997 (BMNH); Sierra del Libano, 6,000′ [1,846 m], 1 ♀, V-1899 (H. H. Smith, BMNH).

Additional specimens examined.—VENEZUELA: Aragua: 1 km south of Rancho Grande, 1 ♂, 5-II-1976 (C. M. & O. S. Flint, USNM); Rancho Grande, cloud forest, 1,100 m, 1 ♀, 30/31-III-1978 (J. B. Heppner, USNM); T. F. Amazonas, Cerro de Neblina, Camp VII, 1,850 m, 0°51′N, 65°58′′W, 1 ♀, 2/4-XII-1984 (R. Brown, USNM).

Diagnosis.—*Lobogenesis magdalenana* is most similar to *L. larana* and *L. lobata*; the differences in male genitalia are discussed above in the diagnosis of *L. larana.* The female genitalia can be distinguished by the shape of the mesal notch of the sterigma: V-shaped in *L. magdalenana* and more U-shaped in *L. larana.*

Remarks.—Male and female genitalia of the specimens from Venezuela, deviate slightly from those of specimens from Colombia: the linear row of fine spinelike



Figs. 6–8. Male genitalia of *Lobogenesis*; valvae spread, aedeagus removed. 6, *L. peruviana*. 7, *L. antiqua*. 8, *L. contrasta*.

teeth in the apical region of the valva consists of considerably fewer teeth in the male, and the antrum is slightly more rounded in the female. In addition, forewing length is conspicuously less in the female from Rancho Grande. However, because the genitalic differences are considerably less than that between other species of *Lobogenesis,* they are interpreted as geographic, infraspecific variation within *L. magdalenana.* Additional specimens are necessary to determine whether or not this interpretation is correct.

Etymology.—The specific epithet refers to the province of Magdalena.

Lobogenesis contrasta J. Brown, new species
(Figs. 8, 27)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, tan-brown; roughened above, dark copper-brown Labial palpus pale tan mesally, dark red-brown laterally. Antennal scaling brown. *Thorax:* Mostly dark brown. *Forewing:* Length 6.8–8.0 mm ($\bar{x}$ = 7.2; n = 6). Upper side white, with faint, diffuse, pale yellow-tan overscaling; basal 0.2 dark brown with some red-brown scales; dark brown, semicircular patch bordering costa ca. 0.45–0.60 from base; two small, brown, triangular dots on costa between large costal patch and apex; termen with diffuse brownish striae, with a few pale yellow-green scales; a varibale, ill-defined line from dorsum near tornus. Under side nearly uniform tan-brown. *Hindwing:* Upper side dingy pale yellow with pale gray-brown mottling. Under side light gray-brown with darker mottling. *Genitalia:* As in Fig. 8 (drawn from USNM slides 68611 and 89440; n = 3). Uncus slender from broad, expanded cap on dorsum of tegumen, bifurcate in distal 0.5, with swollen, foot-shaped processes apically. Socius large, hairy, with conspicuous portion dorsad of attachment. Gnathos comparatively slender, arms free distally, with shovel-shaped, attenuate tip. Transtilla complete, more strongly sclertoized mesally. Valva broadest at base, slightly attenuate distally, with a pair of triangular lobes at costa, one at base, contiguous with transtilla, the second as a free rounded flange near mid-costa; a densely setose region in basal 0.33, continuing toward apex as a long, curved, sclerotized line. Aedeagus relatively slender, slightly curved; phallobase with a large, rounded, membranous cap.

Female. Unknown.

Type.—Holotype, ♂, Bolivia, Incachaca, Cochabamba, tropical cloud forest area, 2,100 m, 27-VIII/5-IX-1956 (L. Peña, USNM).

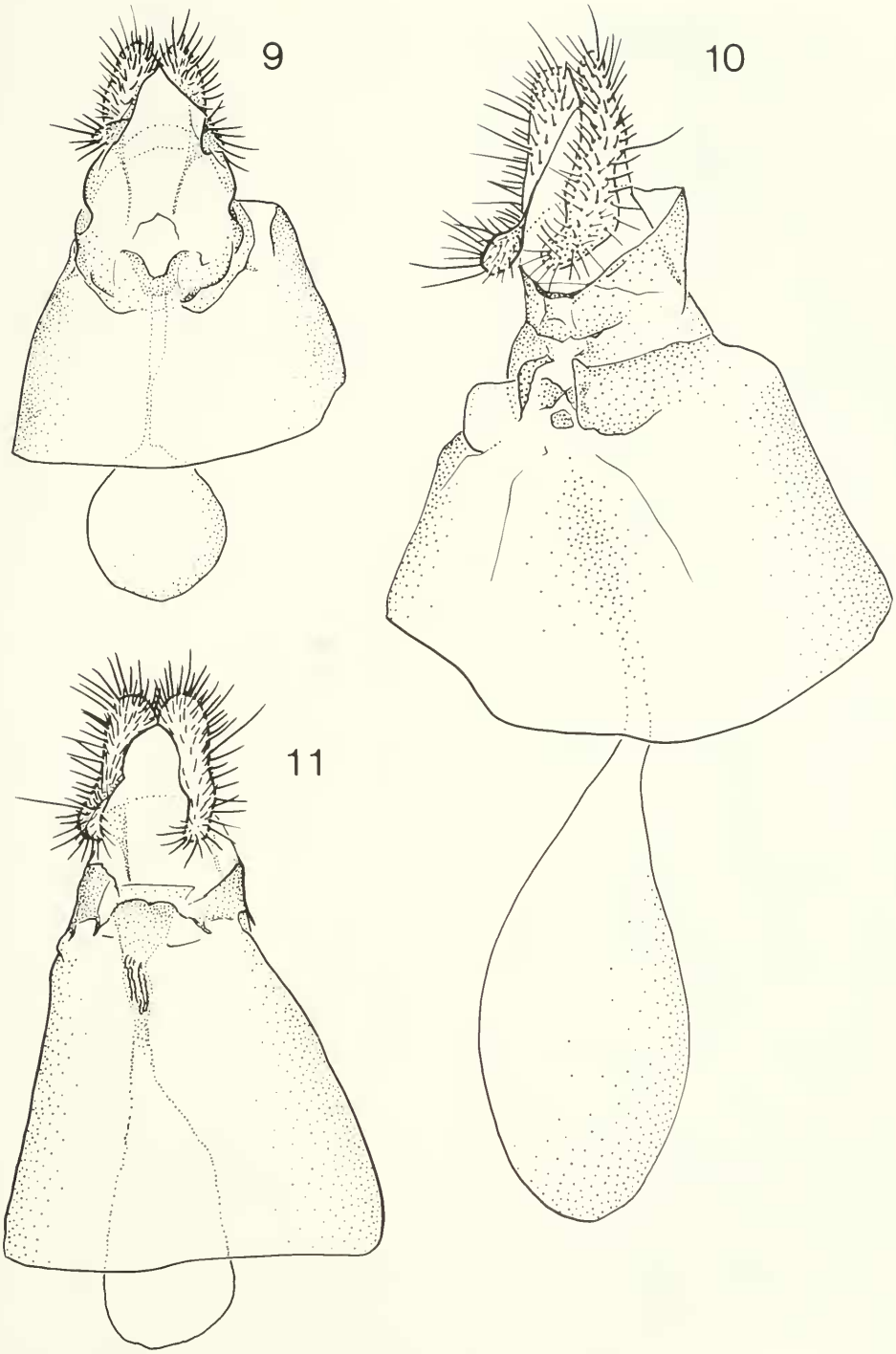
Paratypes, 5 ♂, same data as holotype.

Diagnosis.—*Lobogenesis contrasta* is most similar to *L. peruviana* and *L. antiqua* in size, forewing maculation, and male genitalia. It be can be distinguished from *L. peruviana* by its simple aedeagus—that of *L. peruviana* has a distinct ventral thorn from near the middle. It can be separated from *L. antiqua* by the shape of the sclerotized ridge across the face of the valva (see Figs. 6–7), which is more strongly curved in the latter.

Etymology.—The specific epithet is an adjective, referring to the contrast between the pale ground color and the forewing pattern elements.

Lobogenesis peruviana J. Brown, new species
(Figs. 6, 10, 29)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, whitish and pale tan; roughened above, pale tan. Labial palpus pale tan mesally, brown mixed with yellow-tan laterally. Antennal scaling brown. *Thorax:* Mostly gray white, with red-brown prothoracic collar and brown tegula. *Forewing:* Length 7.5 mm (n = 1). Upper side silver white, with faint pale yellowish overscaling; basal 0.2 dark red-brown; dark red-brown semicircular patch bordering costa ca. 0.45–0.60 from base, second smaller



Figs. 9–11. Female genitalia of *Lobogenesis*. 9, *L. lobata*. 10, *L. peruviana*. 11, *L. larana*.

patch at ca. 0.75 distance from base; termen with diffuse gray-brown striae, with a few pale green and yellow sclaes. Under side nearly uniform tan brown. *Hindwing:* Upper side whitish with pale grayish mottling. Under side light grayish with darker mottling. *Genitalia:* As in Fig. 6 (drawn from BMNH slide 29061; n = 1). Uncus slender from enlarged cap on dorsum of tegumen, bifurcate in distal 0.5; each tip bearing an enlarged triangular process, with two long, fine, subapical setae. Socius large, hairy, with conspicuous portion dorsad of attachment. Gnathos arms comparatively slender, separate distally, each with a shovel-shaped, attentuate tip. Transtilla complete, weakly U-shaped, with small upturned flap from venter near middle. Valva broadest at base, slightly attenuate apically, with a slender, digitate projection from costa at base; densely setose area in basal 0.33, extending toward apex as curved, sclerotized line. Aedeagus undulate, moderately broad, with distinct thorn from venter near middle; phallobase with large, rounded, membranous cap.

Female. FW length 8.0 mm (n = 1). Superficially as in male, except lacking elongate antennal cilia. *Genitalia:* As in Fig. 10 (drawn from BMNH slide 29062; n = 1). Papillae anales unmodified. Apophyses posteriores moderate in length; apophyses anteriores reduced to short, slender, semi-membranous nub. Sterigma a broad, sclerotized band, with inverted U-shaped membranous region surrounding ostium; ostium represented by small U-shaped sclerite. Ductus bursae relatively short, slender, frail. Corpus bursae rounded, pear-shaped.

Types.—Holotype, ♂, Peru, Pillahuata, Cuzco, 2,600 m, 14/16-VIII-1982 (M. Matthews & M. Packer, BMNH).

Paratype, 1 ♀, same data as holotype (BMNH).

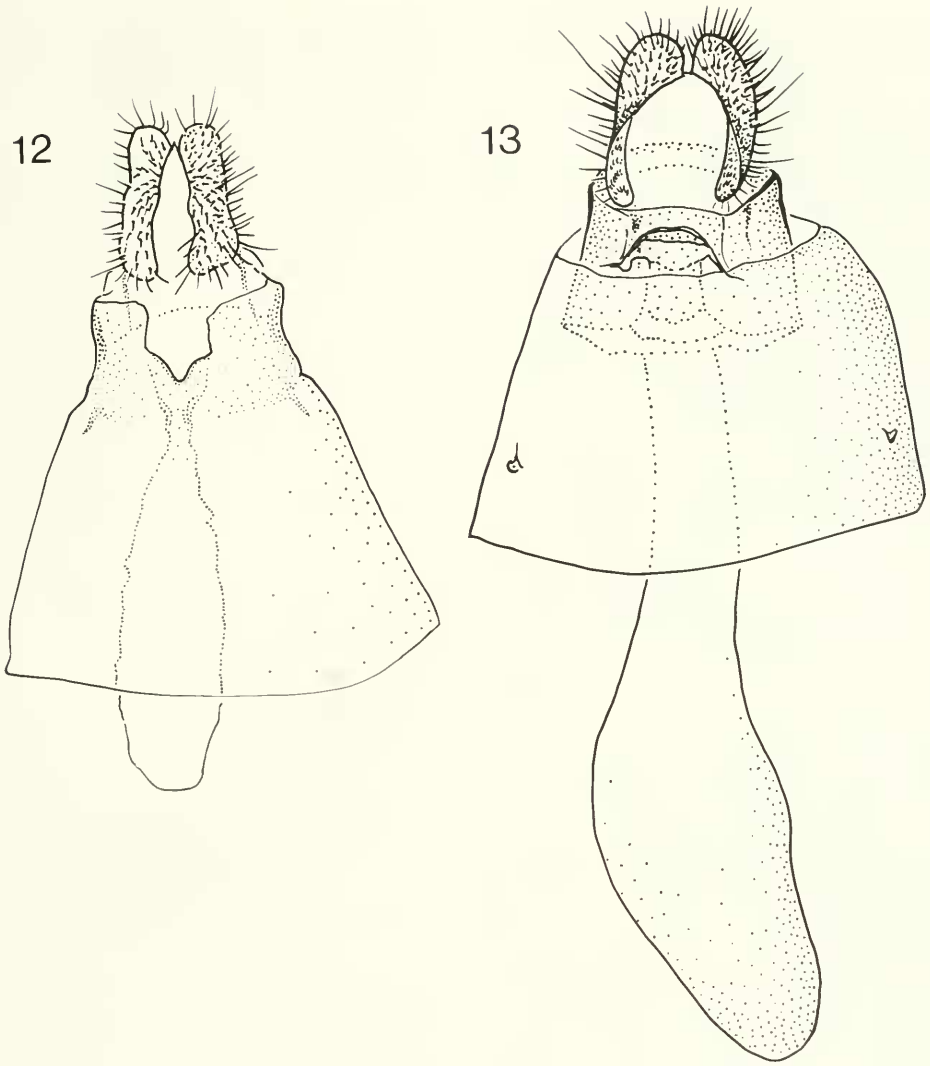
Diagnosis.—*Lobogenesis peruviana* is the largest species in the genus and is most similar to *O. contrasta.* It can be distinguished by the characters cited above in the diagnosis for *O. contrasta.* Autapomorphies for *L. peruviana* include the triangular apical processes and setae of the distal portion of the uncus, the upturned mesal ventral portion of the transtilla, and the thorn from the venter of the aedeagus.

Etymology.—The specific epithet is an adjective referring to the country of its capture.

Lobogenesis antiqua J. Brown, new species

(Figs. 7, 28)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, tan-brown; roughened above, bronze-brown. Labial palpus pale tan mesally, mostly brown laterally. Antennal scaling brown. *Thorax:* Dark brown mixed with red brown. *Forewing:* Length 7.8 mm (n = 1). Upper side dingy white, with faint pale tan-yellow overscaling; basal 0.2 dark brown; dark brown semicircular patch bordering costa ca. 0.45–0.60 from base, two additional small costal spots between semicircular patch and apex; termen with irregular brownish reticulations. Under side uniform tan-brown with faint indication of upper side markings. *Hindwing:* Upper side whitish with pale grayish mottling. Under side light grayish with darker mottling. *Genitalia:* As in Fig. 7 (drawn from BMNH slide 29063; n = 1). Uncus slender from broad, enlarged cap on dorsum of tegumen; uncus missing distal one-half (assumed to be bifurcate). Socius large, hairy, with conspicuous portion dorsad of attachment; weakly sclerotized along outer edge. Gnathos arms comparatively slender, arms separate distally, each with a triangular tip. Transtilla complete, most strongly sclerotized mesally. Valva broadest at base, weakly attenuate apically, with two projections from costa, one at base contiguous with transtilla, the second a free, rounded flange at ca. mid-costa; densely setose area in basal 0.33, extending toward apex as curved, sclerotized line. Aedeagus



Figs. 12–13. Female genitalia of *Lobogenesis*. 12, *L. magdalenana*. 13, *L. varnicosa*.

nearly straight, relatively slender; phallobase with broad, rounded, membranous cap.

Female. Unknown.

Type.—Holotype, ♂, Bolivia, Yungas del Espíritu Santo, Cochabamba, 1888–89, Paravicini Coll., BM 1937–383 (P. Germain, BMNH).

Diagnosis.—*Lobogenesis antiqua* is most similar to *L. contrasta*; superficially, it has a more yellowish tan forewing ground color. The male genitalia of *L. antiqua* can be distinguished from those of *L. contrasta* by the conspicuously longer linear row of spinelike teeth in the apical region of the valva, the larger patch of setae in the basal 0.33 of the valva, and the more undulate sclerotized line extending from the setose patch to the apex of the valva (see Figs. 7–8).

Etymology.—The specific epithet, from the word antique, is an adjective referring to the fact that the type specimen was collected more than 100 years ago.

***Lobogenesis varnicosa* J. Brown, new species**

(Figs. 13, 31)

Description.—Male. Unknown.

Female. *Head:* Frons with sparse, smooth scaling below mid-eye, whitish and pale tan; roughened above, pale tan. Labial palpus pale whitish mesally, light brown laterally. Antennal scaling brown. *Thorax:* Pale tan. *Forewing:* Length 6.5–7.2 mm ($\bar{x}$ = 6.8; n = 2). Upper side dingy white, with faint brownish overscaling and darker brown striae; basal 0.2 dark brown; dark brown triangular patch bordering costa ca. 0.45–0.60 from base, with a dark brown dash immediately below, near apex of DC. Under side nearly uniform tan brown. *Hindwing:* Upper side dingy whitish with pale gray-brown overscaling and mottling. Under side light grayish with darker mottling. *Genitalia:* As in Fig. 13 (drawn from USNM slide 89267; n = 2). Papillae anales unmodified. Apophyses posteriores moderate; apophyses anteriores reduced to short, slender, semi-membranous nub. Sterigma a broad, weakly sclerotized band, with inverted U-shaped arch dorsad of ostium. Ductus bursae relatively long, undifferentiated from corpus. Corpus bursae long, moderately slender.

Types.—Holotype, ♀, Argentina, Tucumán, Ciudad Universitaria, 17-II-1959 (J. F. G. Clarke, USNM).

Paratype, 1 ♀, same data as holotype (USNM).

Diagnosis.—Superficially, *Lobogenesis varnicosa* is virtually indistinguishable from most other species in the genus. The genitalia are most like those of *L. peruviana* among described species. They are easily distinguished by the strongly sclerotized area around the ostium (see Figs. 10, 13).

Etymology.—The specific epithet is a manuscript name used by Josef Razowski for this species; its origin is unknown to me.

Odonthalitus Razowski 1992

Odonthalitus Razowski 1992: 208; Powell et al. 1995: 145.

Type species.—*Odonthalitus lacticus* Razowski 1992, by monotypy.

Redescription.—*Head:* Antennal cilia ca. 3.0 times width of flagellomere in male, ca. 0.5 times width of flagellomere in female. Labial palpus (segments II and III combined) ca. 1.5 times horizontal diameter of compound eye; segment II weakly upturned, slightly expanded distally by scaling; segment III 0.3–0.4 as long as II, smooth-scaled, exposed. Maxillary palpus rudimentary. Frons with overhanging tuft of scales. Ocelli small or absent. Chaetosema present. Proboscis present, presumably functional. *Thorax:* Smooth-scaled. Legs unmodified, male without foreleg hairpencil. *Forewing:* Length 2.3–2.4 times width; length of DC about 0.55 times FW length; width of DC about 0.20 DC length; CuA_2 originates about 0.60 along length of DC; all veins separate beyond DC; chorda and M-stem absent. No upraised scale tufts; male without costal fold. *Hindwing:* Sc+R and Rs closely approximate; M_3 and CuA_1 closely approximate; tuft of hairlike scales along 1A+2A, originating near base of wing. *Abdomen:* Dorsal pits absent; no modified corethrogyne scaling in female. *Male genitalia:* Uncus bifurcate, each arm slender; arms either from a common stalk or widely separated basally. Socius variable, usually narrow, digitate, not fused to gnathos. Gnathos simple, non-dentate, arms narrow, usually joined distally. Subscaphium and hami absent. Transtilla a simple, slender band, frequently reduced or membranous. Valva moderately short, somewhat triangular-lanceolate. Pulvinus absent. Vinculum complete. Juxta a sclerotized plate. Aedeagus long, slender, straight or curved; phallobase simple; cornuti absent. *Female genitalia:* Papillae anales narrow, variably notched mesally in a few species. Apophyses posteriores moderately short, anteriores reduced to a nub in most species. Sterigma a simple scobinate band. Ductus bursae moderately long, membranous. Corpus bursae frail, elongate, pear-

shaped or ovoid; spicules and signum lacking. Accessory bursa frequently present.

Diagnosis.—Adults of *Odonthalitus* are characterized by a white, cream, or pale tan forewing ground color with a simple pattern that includes a dark, trapezoidal, triangular, or semicircular patch near the middle of the costa and a dark basal patch. In a few species the pattern is variably obscured by darker overscaling, particularly in females. Males have elongate antennal cilia (ca. 3 times the width of the flagellomere) and lack the characteristic euliine male foreleg hairpencil (Brown 1990). Most species are extremely similar in facies, and examination of the genitalia is required for accurate identification.

Superficially, adults of *Odonthalitus* are indistinguishable from those of *Lobogenesis*. Characters that distinguish the two are discussed above in the redescription of *Lobogenesis*. In addition, a few species of *Odonthalitus* have a modification of the papillae anales in the female genitalia in which they are variably differentiated into a dorsal and ventral lobe separated by a weak indentation (i.e., *viridimontis* and *paos*) or distinct, deep notch (i.e., *lacticus*).

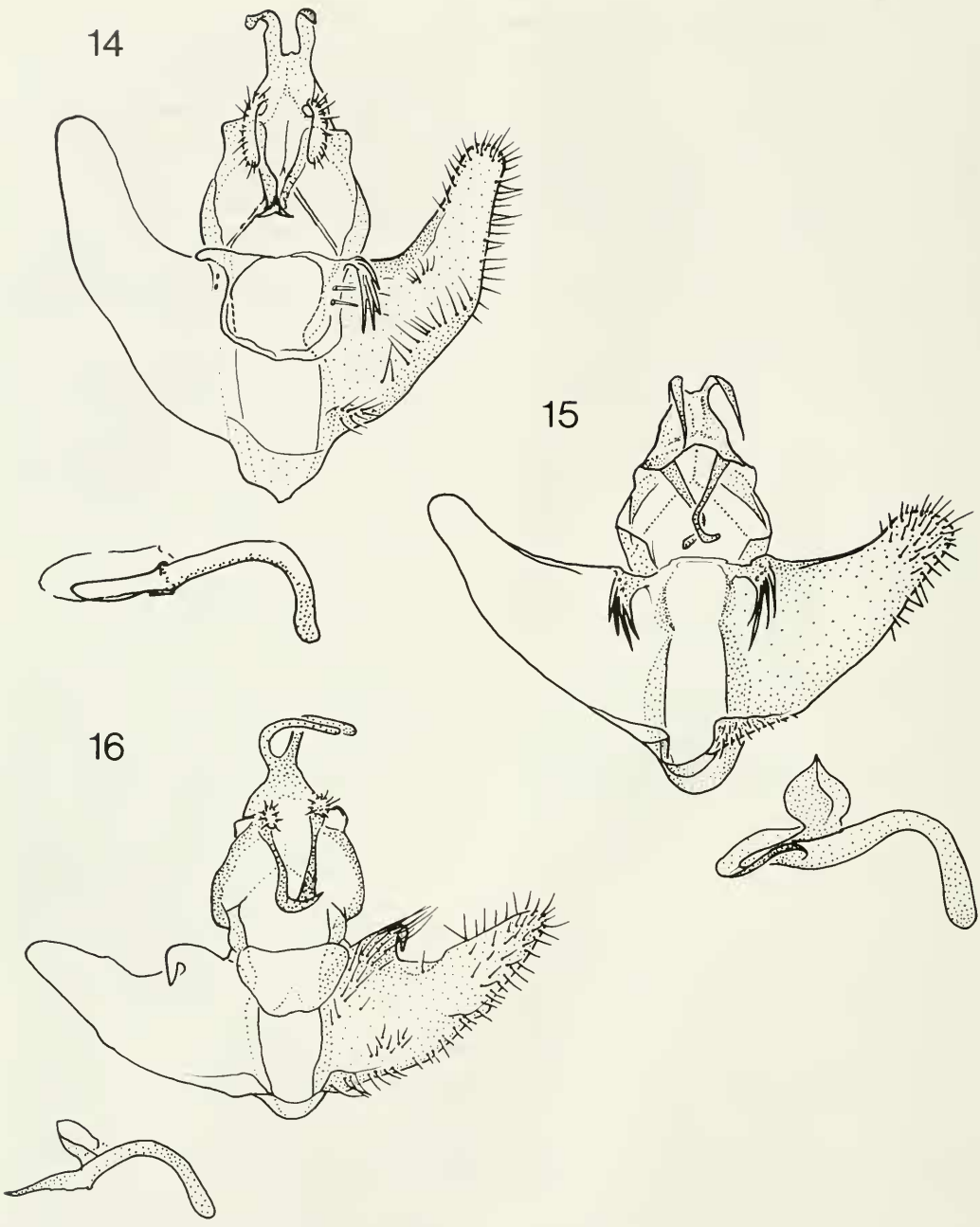
Distribution and biology.—*Odonthalitus* is known from montane oak-pine forest habitat from Durango, Mexico, south to Costa Rica, at 1,000–2,600 m elevation. Adults have been collected at lights. A single individual of *O. paos* was reared by J. Powell on synthetic diet from eggs deposited by a field-collected female, suggesting that the larvae are general-feeders. Two species are known to be sympatric in Costa Rica (at Aquiares, Cartago Province) and Mexico (at Paradero de Mi Ká, Oaxaca).

Remarks.—As with *Lobogenesis*, most species of *Odonthalitus* are rare in collections; the 9 species treated below are represented by 53 specimens. Five species are known only from the holotype—3 from males and 2 from females. Approximately 62% (n = 33) of the specimens examined represent a single species, *O. viridimontis*, that appears to be restricted to Costa Rica. The availability of specimens from Costa Rica can be attributed primarily to the efforts of parataxonomists associated with INBio, a program that is contributing significantly to our understanding of the Lepidoptera fauna of the New World tropics; in addition, the work of Jerry Powell, Dan Janzen, and others have stimulated this effort. The present treatment results in the descriptions of 6 new species and the reassignment of 2 previously described species in *Odonthalitus*. The new combinations are proposed for 2 species previously considered "Unplaced Euliini" (Powell et al. 1995).

Odonthalitus bisetanus J. Brown, new species

(Figs. 14, 34)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, pale brown; roughened above, pale yellow. Labial palpus whitish yellow mesally, brown laterally. Antennal scaling bronze-brown. *Thorax:* Pale tan. *Forewing:* Length 7.0 mm (n = 1). Upper side pale tan; basal 0.2 dark brown; dark brown, triangular patch near middle of costa, with vertex of triangle curving outward toward termen; three small irregular spots at costa between patch and apex; apex and termen with irregular brown striae. Under side uniform dark tan with faint indication of upperside markings. *Hindwing:* Upper side pale cream with pale gray-brown mottling. Under side light gray brown with darker mottling. *Genitalia:* As in Fig. 14 (drawn from JWB slide 650; n = 1). Uncus bifurcate from base. Gnathos and socius unmodified. Transtilla membranous mesally. Valva broadest at base, weakly attenuate distally; junction of costal base and transtilla with large hooklike process comprised of 4 strong, weakly curved spines; 2 large setae below hooklike process along inner edge of valva. Aedeagus moderately slender, nearly j-shaped, with



Figs. 14–16. Male genitalia of *Odonthalitus*; valvae spread, aedeagus removed. 14, *O. bisetanus*. 15, *O. improprius*. 16, *O. conservanus*.

greatly enlarged membranous cap on phallobase.

Female. Unknown.

Type.—Holotype, ♂, Mexico, Oaxaca, Mpio. Yolox, Paradero de Mi Ká, 2,000 m, 5/14-XI-1980 (E. Welling, UCB).

Diagnosis.—The group of long curved spines at the base of the valva in the male

genitalia immediately distinguish *Odonthalitus bisetanus* from all other species except *O. improprius*. These two species can be separated by the following: base of the uncus bifurcations rectangular in *O. bisetanus* and rounded in *O. improprius*; tip of the uncus bifurcations sightly flattened in *O. bisetanus* and pointed in *O. improprius*; patch of long spines from a lobe at the base of the transtilla in *O. bisetanus* and from a narrow, attenuate flange in *O. improprius*; and a pair of large, strong setae just below the basal lobe of the transtilla in *O. bisetanus* lacking in *O. improprius*.

Etymology.—The specific epithet refers to the two setae at the base of the valva.

Odonthalitus improprius J. Brown, new species

(Fig. 15)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, whitish; roughened above, whitish. Labial palpus whitish mesally, brown laterally. Antennal scaling pale bronze-brown. *Thorax:* Pale tan. *Forewing:* Length 5.8 mm (n = 1). Upper side pale tan; basal 0.2 dark brown; dark brown, triangular patch near middle of costa, with vertex of triangle curving outward toward termen; two small triangular spots at costa between patch and apex; terminal region with diffuse brown striae. Under side uniform dark tan with faint indication of upperside markings. *Hindwing:* Upper side pale cream with pale gray-brown mottling. Under side light gray brown with darker mottling. *Genitalia:* As in Fig. 15 (drawn from JWB slide 699; n = 1). Uncus bifurcate from base. Gnathos and socius unmodified. Transtilla membranous mesally. Valva broadest at base, slightly attenuate distally; junction of costal base and transtilla with flat, claw-shaped flange with 4 strong spines from its venter. Aedeagus moderately slender, nearly j-shaped, with greatly enlarged membranous cap on phallobase.

Female. Unknown.

Type.—Holotype, ♂, Mexico, Oaxaca, Mpio. Yolox, Paradero de Mi Ká, 2,000 m, 5/14-XI-1980 (E. Welling, UCB).

Diagnosis.—*Odonthalitus improprius* is extremely similar to *O. bisetanus*; the differences are detailed above in the diagnosis of the latter.

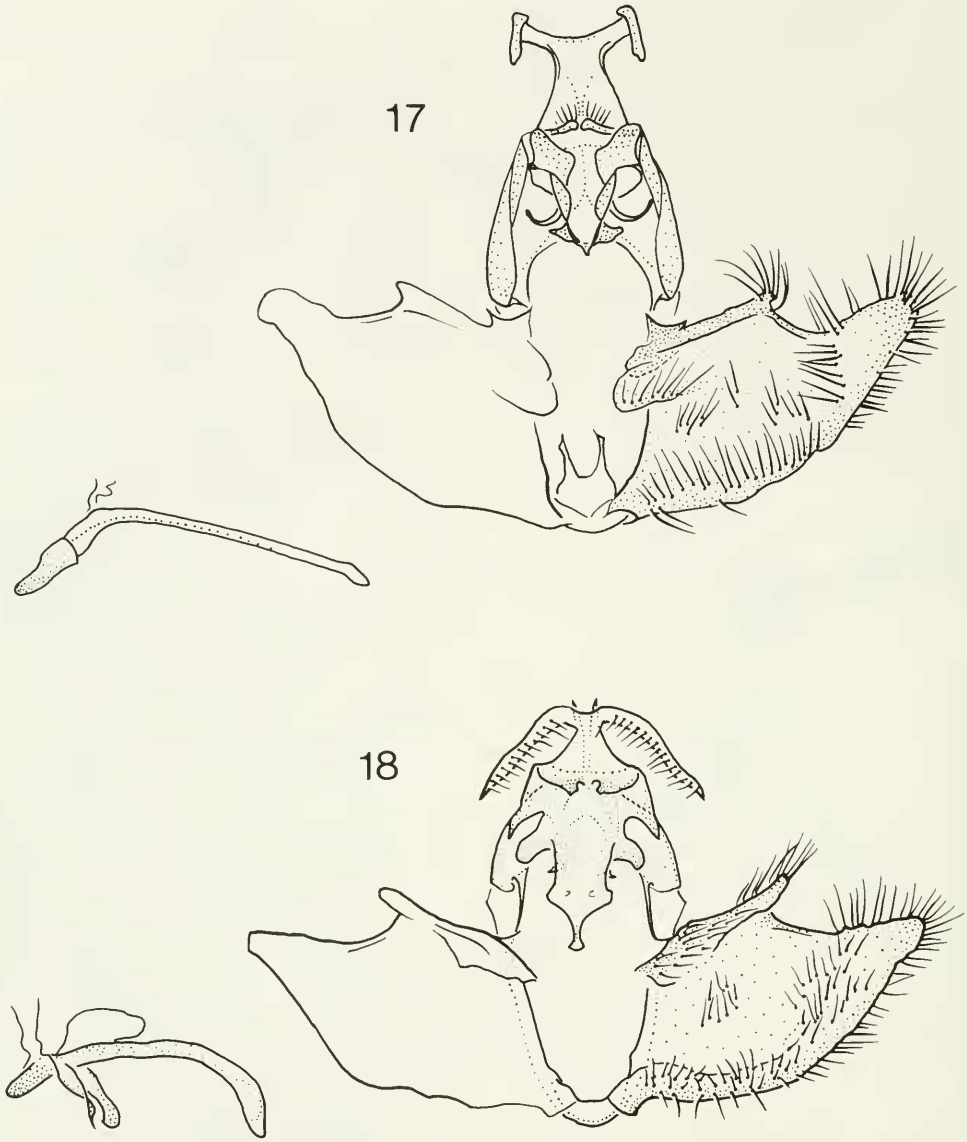
Etymology.—The specific epithet is Latin for inappropriate or improper.

Odonthalitus conservanus J. Brown, new species

(Figs. 16, 21)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, pale tan-brown; roughened above, bronze-brown. Labial palpus pale whitish mesally, brown laterally. Antennal scaling pale bronze-brown. *Thorax:* Tan brown. *Forewing:* Length 5.0 mm (n = 1). Upper side whitish with irregular, fine, brown reticulations throughout; basal 0.2 dark brown; dark brown, triangular patch at middle of costa. Under side uniform dark tan with faint indication of upper side markings. *Hindwing:* Upper side light gray brown with slightly darker gray brown mottling. Under side light gray-brown with darker mottling. *Genitalia:* As in Fig. 16 (drawn from JWB slide 606; n = 1). Uncus bifurcate from base, arising from narrow dorsal nub. Gnathos and socius unmodified. Transtilla a broad, weakly sclerotized plate. Valva broadest at base, attenuate distally, with rounded excavation at costa ca. 0.33 distance from base to apex; inner portion of excavated region bearing a large sclerotized hooklike process, with patch of fine setae from valva just ventrad of hook. Aedeagus moderately slender, nearly j-shaped, with greatly enlarged membranous cap on phallobase.

Female. FW length 6.5–6.8 mm ($\bar{x}$ = 6.6; n = 4). Essentially as described for male, except entire FW evenly overscaled with brown, nearly obscuring FW pattern. *Genitalia:* As in Fig. 21 (drawn from JWB slide 607; n = 2). Papillae anales unmodified, from bristly base. Papillae anales mod-



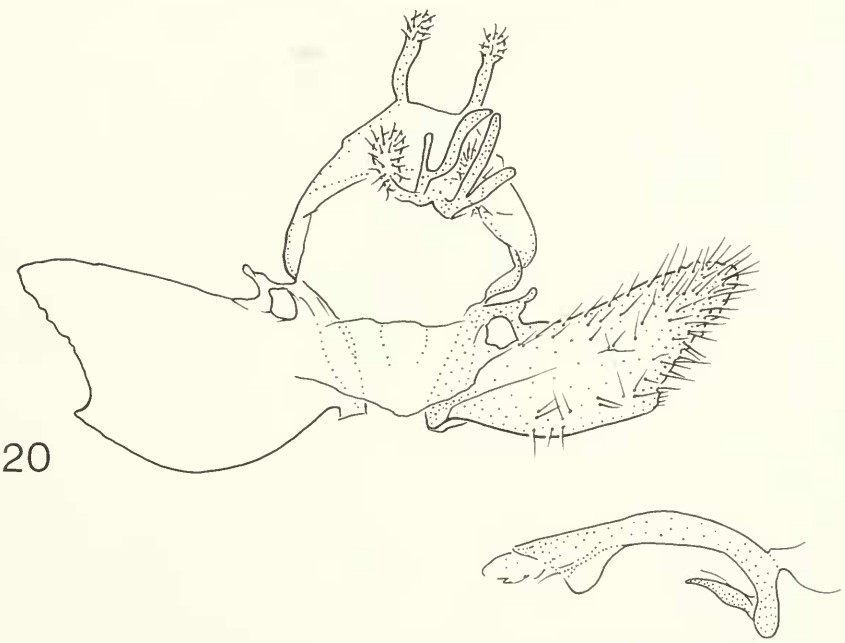
Figs. 17–18. Male genitalia of *Odonthalitus*; valvae spread, aedeagus removed. 17, *O. viridimontis*. 18, *O. poas*.

erately long, unmodified. Sterigma an irregular, sclerotized band, with a bristly lobe at each postero-lateral margin; mesal portion of sterigma surrounding ostium somewhat diamond-shaped; ostium at anterior vertex of diamond. Ductus bursae membranous, undifferentiated from corpus bursae, slender, frail.

Types.—Holotype, ♂, Mexico, Jalisco, Sierra de Manantlan, nr. Las Joyas, 1,800 m, 18-VII-1985 (J. Doyen, UCB).

Paratypes, 4 ♀ as follows: MEXICO: Jalisco: same locality as holotype, 2 ♀, 16-VII-1985, 1 ♀, 18-VII-1985 (J. Doyen, UCB, USNM); 11.6 mi [18.6 km] S of El Chante, 1 ♀, 3-IV-1987 (N. Bloomfield, SDNHM).

Diagnosis.—The male genitalia of *Odon-*



Figs. 19–20. Male genitalia of *Odonthalitus*; valvae spread. 19, *O. regilla*. 20, *O. lacticus*.

thalitus conservanus are most similar to those *O. bisetanus* and *O. improprius*. They can be distinguished from the latter two by the large hooklike process at the base of the valva, the absence of the patch of hooklike spines at the base of the transtilla, and the broad, shield-shaped transtilla. The female genitalia are most similar to those of *O. fuscomaculatus* in the presence of a pair of scobinate lobes on the sterigma and the relatively unmodified (i.e., long) apophyses anteriores.

Etymology.—The specific epithet refers

to the "conserved" status of the type locality of Las Joyas in the Sierra de Manantlan, a global biosphere reserve in western Mexico.

Odonthalitus orinoma (Walsingham 1914), **new combination**
(Fig. 26)

Tortrix orinoma Walsingham 1914: 287.
Anopina orinoma: Obraztsov 1962: 27; Powell et al. 1995: 142.

Redescription.—Male. Unknown.

Female. *Head:* Frons with sparse, smooth scaling below mid-eye, pale tan; roughened above, cream and brown. Labial palpus pale whitish yellow mesally, tan laterally. Antennal sclaing light brown. *Thorax:* Brown. *Forewing:* Length 7.5 mm (n = 1). Upper side pale cream with nearly uniform pale brown overscaling; basal 0.2 dark brown; triangular brown patch bordering costa ca. 0.45–0.65 distance from base; costa between latter patch and apex with three small brown triangular spots; terminal region with irregular brown striae. Under side uniform dark tan with faint indication of upper side markings. *Hindwing:* Upper side pale gray-brown. Under side pale gray brown. *Genitalia:* As in Fig. 26 (drawn from BMNH slide 66598; n = 1). Papillae anales unmodified. Apophyses posteriores unmodified; apophyses anteriores greatly reduced. Sterigma a sclerotized band, with ill-defined scobinate plates on each side of ostium and a sclertoized, tubelike region mesally; ostium covered by rounded, semimembranous plate. Ductus bursae long, slender, undifferentiated, gradually widening to corpus bursae.

Type.—Holotype, ♀, Mexico, Guerrero, Omilteme, 8,000′ [2,580 m], VII-1880 (H. H. Smith, BMNH).

Diagnosis.—*Odonthalitus orinoma* is most similar to *O. fuscomaculatus* in facies and female genitalia. The two can be distinguished by features of the female genitalia—*O. fuscomaculatus* has conspicuously longer apophyses, an undulate anterior edge of the sterigma, and a shorter ductus bursae (see Figs. 22, 26).

Remarks.—The forewing pattern is illustrated in Walsingham (1914) and the genitalia in Obraztsov (1962). Obraztsov (1962) transferred "*T.*" *orinoma* to *Anopina* on the basis of the similarity in forewing pattern, indicating that "Until the male of *orinoma* is known, the systematic position of this species is somewhat doubtful." The combination of forewing length and pattern, and the extremely short apophyses clearly indicate that it belongs in *Odonthalitus.*

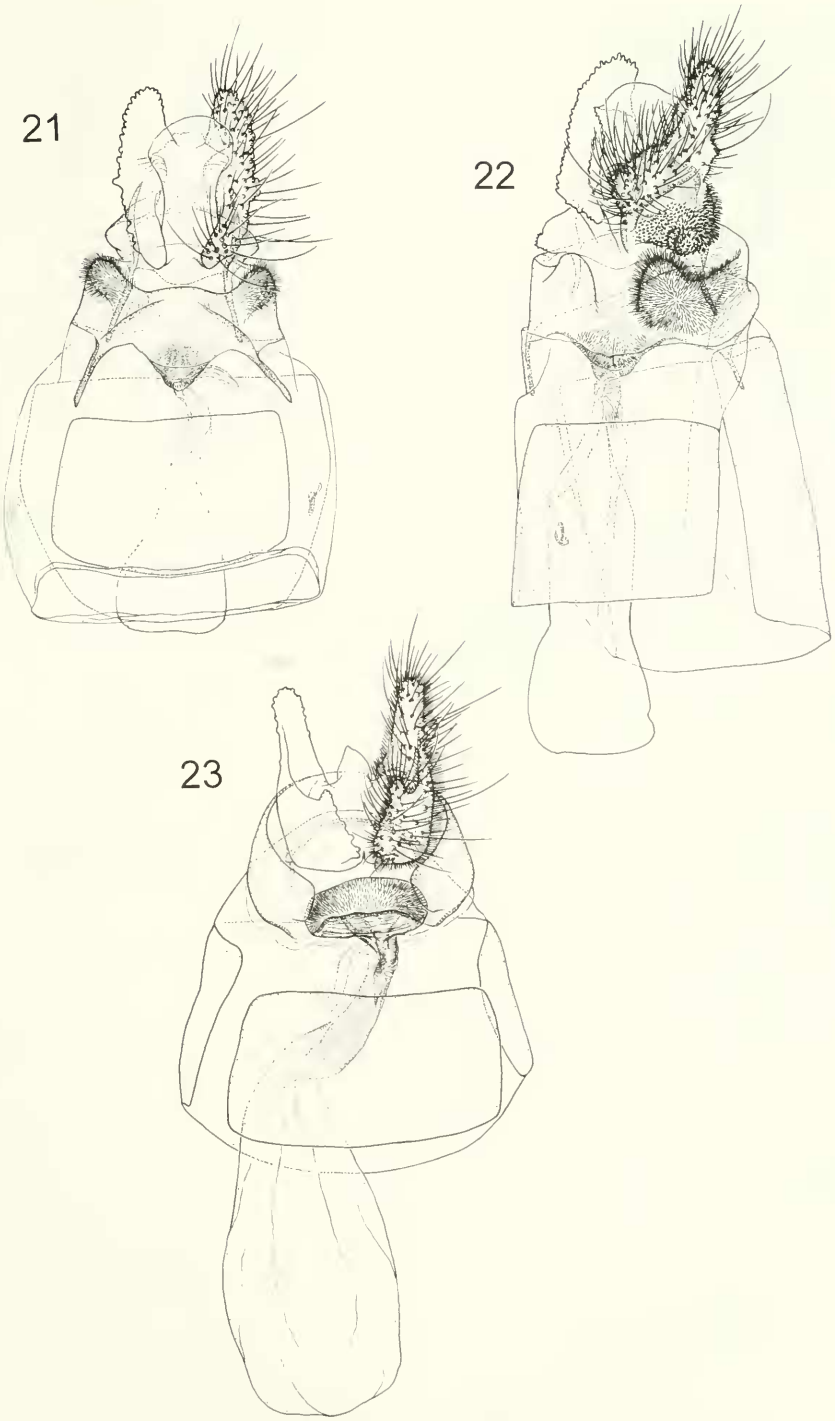
***Odonthalitus fuscomaculatus* J. Brown, new species**
(Fig. 22)

Description.—Male. Unknown.

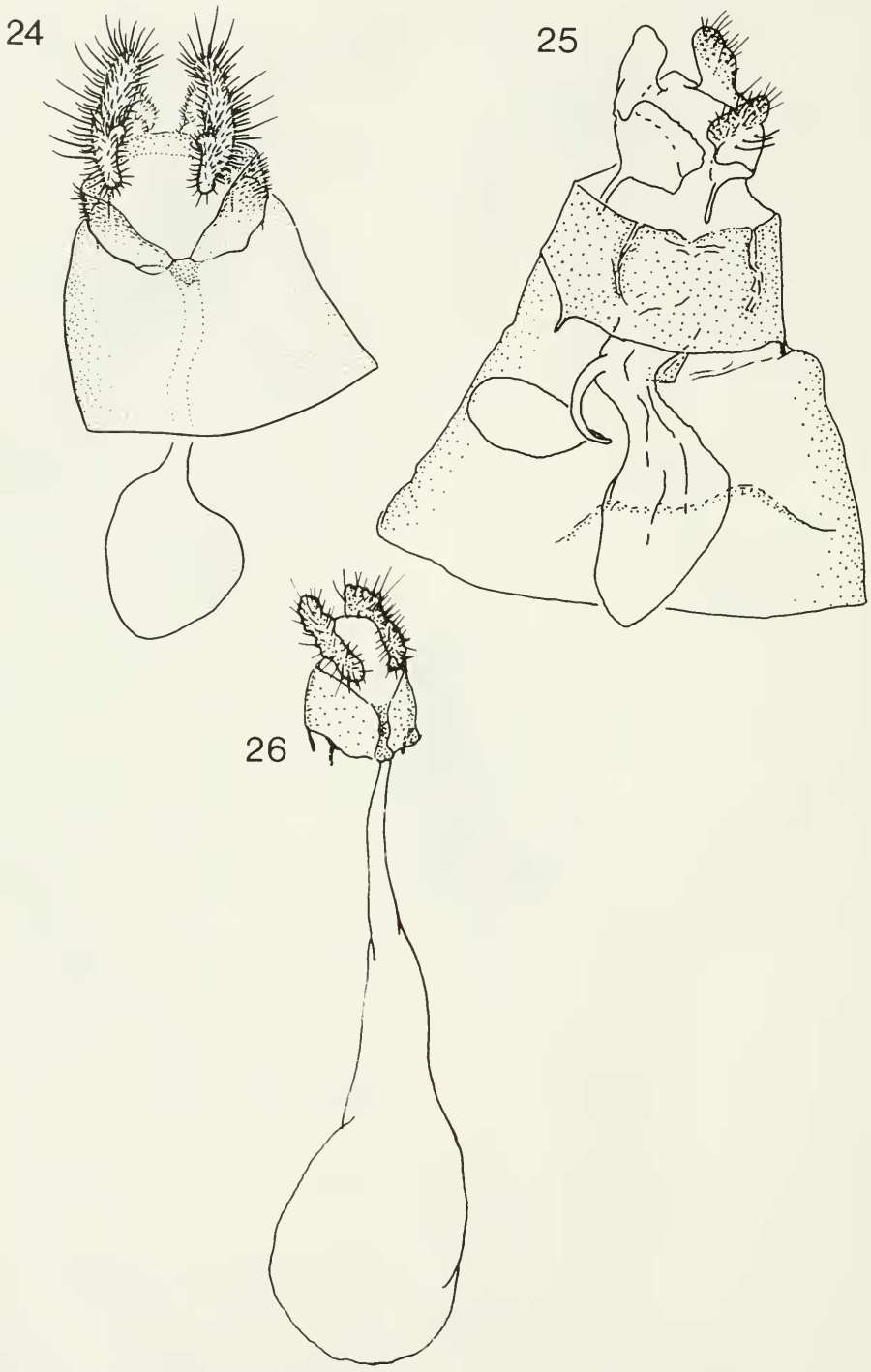
Female. *Head:* Frons with sparse, smooth scaling below mid-eye, pale tan; roughened above, pale tan brown. Labial palpus whitish mesally, tan laterally. Antennal scaling light brown. *Thorax:* Brown and pale tan. *Forewing:* Length 7.5 mm (n = 1). Upper side cream, with nearly uniform brown overscaling and irregular brown striae; basal 0.2 dark brown; brown triangular patch bordering costa ca 0.45–0.65 distance from base. Under side uniform dark tan with faint indication of upper side markings. *Hindwing:* Upper side pale gray-brown. Under side pale gray brown. *Genitalia:* As in Fig. 22 (drawn from USNM slide 89449; n = 1). Papillae anales unmodified from bristly base. Apophyses posteriores and anteriores nearly equal in length. Sterigma with a pair of swollen, bristly lobes dorso-laterad of ostium; ostium cup-shaped, sclerotized. Ductus bursae slender, undifferentiated from corpus bursae.

Type.—Holotype, ♀, Mexico, Michoacan, San Lorenzo, Rt. 15, km 206, 19-VII-1966 (O. Flint & A. Ortiz, USNM).

Diagnosis.—*Odonthalitus fuscomaculatus* is most similar to *O. conservanus* in structures of the female genitalia. *Odonthalitus fuscomaculatus* can be distinguish by its larger, cup-shaped ostium, more slen-



Figs. 21–23. Female genitalia of *Odonthalitus*. 21, *O. conservanus*. 22, *O. fuscomaculatus*. 23, *O. poas*.



Figs. 24–26. Female genitalia of *Odonthalitus*. 24, *O. viridimontis*. 25, *O. lacticus*. 26, *O. orinoma*.

der apophyses posteriores, and the more mesal position of the bristly lobes of the sterigma.

Etymology.—The specific epithet is an adjective referring to the dark overscaling of the forewing.

Odonthalitus poas J. Brown, new species
(Figs. 18, 23, 36)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, pale tan; roughened above, bronzy tan. Labial palpus pale cream mesally, bronzy brown laterally. Antennal scaling brown. *Thorax:* Dark brown, whitish tan at mid-dorsum. *Forewing:* Length 5.0–5.5 mm ($\bar{x}$ = 5.4; n = 4). Upper side white, with irregular brown transverse striae, particularly dense in distal 0.33; basal 0.2 dark brown; dark brown triangular or rhomboidal patch bordering costa ca. 0.45–0.60 from base, frequently with small, disjunct spot below lower apex of triangle; costa with a few small brown markings between patch and apex. Under side dark tan with faint indication of upper side markings. *Hindwing:* Upper side dingy white, with pale gray-brown mottling. Under side light gray brown with darker mottling. *Genitalia:* As in Fig. 18 (drawn from JWB slide 761; n = 2). Uncus moderately broad at base, bifurcate in distal 0.75, with fine hairs. Gnathos complex, with various rounded and angulate lateral processes and spines. Transtilla mostly membranous with setate basal portions. Valva broadest at base, attenuate apically, with excavation near mid-point of costa leaving a digitate, hairy, lobelike flange at termination of basal 0.5 of costa. Aedeagus slender, nearly evenly curved throughout; phallobase with ovoid membranous cap.

Female. FW length 6.0 mm (n = 2). Superficially as in male, except slightly larger average forewing length and lacking elongate antennal cilia. *Genitalia:* As in Fig. 23 (drawn from JWB slide 762, Costa Rica; n = 2). Papillae anales with shallow notch near middle. Apophyses anteriores absent; posteriores short, slender. Sterigma a simple, uniform, slightly spiculate band, with a broad subrectangular flap mesally covering ostium. Ductus bursae moderately broad, with patch of weak sclerotization, gently broadening into frail corpus bursae. Corpus bursae oblong.

Types.—Holotype, ♂, Costa Rica, Cartago Province, Río Aquiares, nr. Santa Cruz, 9 km NW Turrialba, 1,500 m, 15-V-1985 (J. Powell, UCB).

Paratypes, 3 ♂, 2 ♀. COSTA RICA: Alajuela Province: NE slope of Volcan Poas, 8 km N Vara Blanca, 1,400–1,450 m, 1 ♂, 6-VI-1988, 2 ♂, 19-VI-1988 (J. Brown & J. Powell, UCB), 1 ♀, 25-VII-1990, JAP 90G20 (S. Meredith & J. Powell, UCB), 1 ♀, 25-III-1992, JAP 92C50 (J. McCarty & J. Powell, UCB).

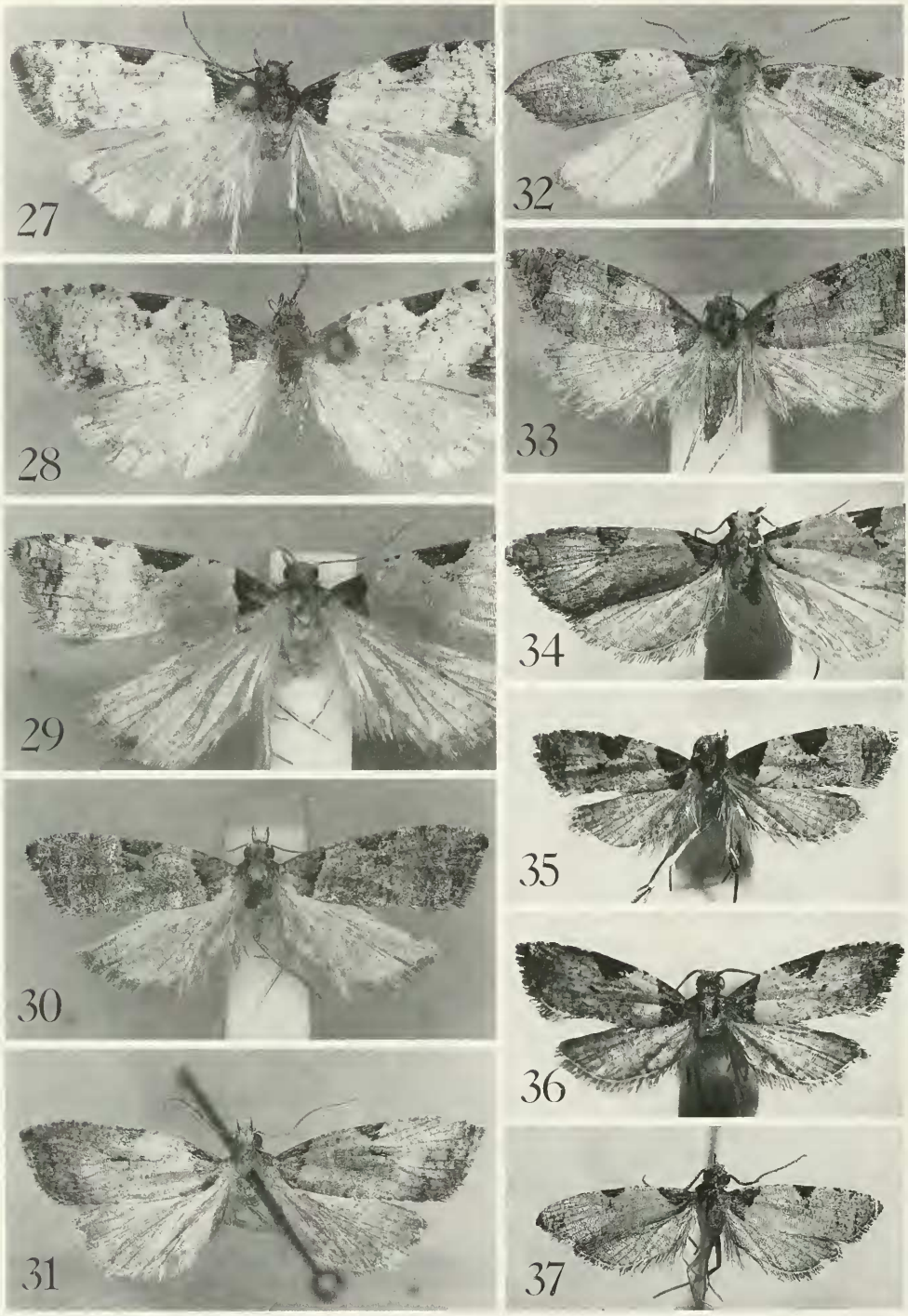
Diagnosis.—*Odonthalitus poas* is most similar to *O. viridimontis*. It can be distinguished superficially from *O. viridimontis* by the brown, rather than yellow, transverse striae. The base of the uncus is much more narrow in *O. poas* and the costal lobe of the valva more pronounced (see Figs. 17–18).

Biology.—A confined female (JAP 90G20) produced two eggs. The larvae were reared on artificial diet; one successfully pupated but did not eclose (J. Powell, personal communication). In general, species that are capable of completing development on artificial diet are general-feeders—the only clue to potential larval host plants of the group.

Etymology.—The specific epithet, a noun in opposition, refers to the collecting locality of all but the holotype on the slope of Mount Poas, Costa Rica.

Odonthalitus viridimontis J. Brown, new species
(Figs. 17, 24, 35)

Description.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, brown and pale yellow; roughened above, bronzy yellow. Labial palpus pale yellow mesally, reddish brown laterally. Antennal scaling brown. *Thorax:* Dark brown. *Fore-*



Figs. 27–37. Adults of *Odonthalitus* and *Lobogenesis*. 27, *L. contrasta* (♂). 28, *L. antiqua* (♂). 29, *L. peruviana* (♀). 30, *L. magdalenana* (♀, Bolivia). 31, *L. varnicosa* (♀). 32, *L. penai* (♂). 33, *L. larana* (♀). 34, *O. bisetanus* (♂). 35, *O. viridimontis* (♂). 36, *O. poas* (♂). 37, *L. magdalenana* (♂, Venezuela).

wing: Length 5.0–5.5 mm ($\bar{x}$ = 5.2; n = 10). Upper side grayish white with faint yellow transverse striae; basal 0.5 dark brown; dark brown semicircular or triangular patch bordering costa ca. 0.45–0.60 from base, frequently with small hooklike marking from lower apex of triangle; terminal area with brown overscaling. Under side dark tan with faint indication of upper side markings. *Hindwing:* Upper side light gray-brown with slightly darker gray-brown mottling. Under side light gray brown with darker mottling. *Genitalia:* As in Fig. 17 (drawn from JWB slide 609, Costa Rica; n = 5). Uncus extremely broad in basal 0.5, arms widely divergent distally. Socii reduced to tiny pads. Gnathos arms complex, with a slender, curved basal appendage. Valva broad at base, attenuate apically, with rounded excavation along costa in distal 0.5. Aedeagus extremely long, slender, bent at ca. 0.33 distance from base to tip.

Female. FW length 5.0–6.5 mm ($\bar{x}$ = 5.6; n = 8). Superficially as in male, except slightly larger average forewing length, frequently with more dense overscaling, and lacking elongate antennal cilia. *Genitalia:* As in Fig. 24 (drawn from JWB slide 793, Costa Rica; n = 5). Papillae anales flattened laterally, weakly notched near middle. Apophyses anteriores absent. Sterigma a simple band, dilated at middle to accommodate ostium. Antrum sclerotized. Ductus bursae frail, slender, undifferentiated from corpus bursae.

Types.—Holotype, ♂, Costa Rica, Puntarenas Province, Monteverde, 1500 m, 11-VI-1988 (J. Brown & J. Powell, UCB).

Paratypes, 17 ♂, 15 ♀. COSTA RICA: Cartago Province: Río Aquiares, nr. Santa Cruz, 9 air km NW Turrialba, 1,500 m, 2 ♀, 16-V-1985 (J. Powell & P. Opler, UCB), 1 ♀, 8-VI-1988, 2 ♂, 1 ♀, 10-VI-1988 (J. Brown & J. Powell, UCB); Monumento Nacional Guayabo, A. C. Amistad, 1,100 m, 1 ♂, VI-1994 (G. Fonseca, INBio). Puntarenas Province: Monteverde, 2 ♂, 1 ♀, 18/19-V-1985 (J. Doyen, UCB), 2 ♀, 11-VI-1988, 1 ♂, 13-VI-1988 (J. Brown & J. Powell, UCB), 1 ♂, 1 ♀, 22/24-VII-1990 (S. Meredith & J. Powell, UCB), 1 ♂, 1 ♀, 29/31-III-1992, UV & MV lights (S. McCarty & J. Powell, UCB); Estacion La Casona, Res. Biol. Monteverde, 1,520 m, 1; fe, XI-1990 (N. Obando), 1 ♂, 1 ♀, X-1991 (J. Saborio, INBio), 1 ♂, IX-1992, 1 ♂, V-1993, 1 ♂, 1 ♀, VIII-1993, 1 ♂, II-1994 (all N. Obando, INBio, USNM); San Luis, Monteverde, A. C. Arenal, 1,000–1,350 m, 2 ♀, VII-1994 (Z. Fuentes, INBio); Buen Amigo, San Luis, Monteverde, 1,000–1,350 m, 1 ♂, VIII-1994, 1 ♀, XII-1996 (Z. Fuentes, INBio); 2 km E of Monteverde, 2 ♂, 12-VI-1988, blacklight (J. Brown & J. Powell, UCB); Estac. Biol. Las Cruces, Río Jaba, 6 km SE San Vito, secondary forest, 1,150 m, 1 ♂, 20/21-I-1993 (J. Powell, UCB).

Diagnosis.—The male genitalia of *Odonthalitus viridimontis* are distinguished easily from those of its congeners by the extremely broad base of the uncus, the shape of the valvae, and the extremely long, slender aedeagus (Fig. 17). Although the shape of the aedeagus is similar to that of *O. regilla* (Fig. 18), the two are not similar in other features of the genitalia.

Etymology.—The specific epithet is a noun referring to the type locality of Monteverde, Costa Rica.

Odonthalitus regilla (Walsingham 1914), **new combination**
(Fig. 19)

Tortrix regilla Walsingham 1914: 289.
"*Eulia*" *regilla:* Powell et al. 1995: 146.

Redescription.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, pale tan-brown; roughened above, bronze-brown. Labial palpus pale whitish yellow mesally, bronze-brown laterally. Antennal scaling pale bronze-brown. *Thorax:* Tan-brown. *Forewing:* Length 7.2 mm (n = 1). Upper side pale red-brown; basal 0.2 dark brown, basal patch wider at costa than at dorsum; dark brown, irregularly triangular patch at middle of costa; a brown spot near

apex of DC at vertex of costal triangular patch; apex and termen with brown band concolorous with costal patch. Under side uniform dark tan with faint indication of upperside markings. *Hindwing:* Upper side light gray brown. Under side light gray brown. *Genitalia:* As in Fig. 19 (photograph of BMNH slide 5794; n = 1). Uncus with a posterior nub, behind (anterad) which are a pair of extremely slender, elongate arms (= bifurcations of uncus) from dorsum of tegumen. Gnathos swollen distally. Socii short, broad. Transtilla membranous, ill-defined. Valva slender, nearly uniform in width, with weak notch along venter ca. two-thirds distance from base to apex; apex with strong, free, curved hook from weakly rounded base. Aedeagus long, straight, extremely slender.

Female. Unknown.

Type.—Holotype, ♂, Guatemala, Retalhuleu, Las Mercedes, 3,000′ [970 m], X/XI-1880, (G. C. Champion, BMNH).

Diagnosis.—The male genitalia of *Odonthalitus regilla* are moderately divergent from other species in the genus: the nearly parallel-sided valva and the clawlike process from the apex are unlike any other species. The long, slender aedeagus is reminiscent of that of *O. viridimontis,* and the basal origin of the bifurcation of the uncus is similar to *O. lacticus.*

Remarks.—The adult is illustrated in Walsingham (1914). The forewing pattern, elongate antennal cilia, bifurcate uncus, and long, slender aedeagus indicate that it belongs in *Odonthalitus.*

Odonthalitus lacticus Razowski 1992
(Figs. 20, 25)

Odonthalitus lacticus Razowski 1992: 208; Powell et al. 1995: 145.

Redescription.—Male. *Head:* Frons with sparse, smooth scaling below mid-eye, pale tan; roughened above, cream. Labial palpus whitish mesally, tan laterally. Antennal scaling light brown. *Thorax:* Brown. *Forewing:* Length 6.5 mm (n = 1). Upper side cream; basal 0.2 dark brown; triangular brown patch bordering costa ca. 0.45–0.65 distance from base; costa between latter patch and apex with three small brown triangular spots; terminal region with irregular brown band. Under side uniform dark tan with faint indication of upperside markings. *Hindwing:* Upper side pale gray brown. Under side pale gray brown. *Genitalia:* As in Fig. 20 (drawn from UCB slide 3392; n = 1). Tegumen short, rounded. Uncus composed of two distinct, widely separated rods. Socius short. Gnathos long, slender, with accessory process near middle, arms separate distally. Valva relatively short, attenuate at apex, venter concave in basal 0.5; costa undifferentiated; sacculus weakly sclerotized. Transtilla a broad rectangular plate. Aedeagus large, curved, broadened apically.

Female. FW length 6.0–7.0 mm ($\bar{x}$ = 6.3; n = 3). Essentially as described for male, except ground color in some specimens evenly dusted with pale brown, reducing definition of forewing markings. *Genitalia:* As in Fig. 25 (drawn from UCB slide 3312 and JWB slide 603; n = 2). Papillae anales with pronounced notch near middle, resulting in bilobed appearance. Apophyses anteriores represented by a short thorn; apophyses posteriores comparatively long. Sterigma a simple, broad, sclerotized band, with a pair of lateral incisions. Ductus bursae broad, moderately short, with fine lines of sclerotization. Corpus bursae short, rounded. Accessory bursa from narrow ductus arising near middle of ductus bursae.

Types.—Holotype, ♀, Mexico, Durango, 4 miles [6.4 km] west of El Palmito, 20-VII-1964, flight trap (J. Powell, UCB).

Paratype, 1 ♂, same data as holotype.

Additional specimens examined.—MEXICO: Sinaloa: 15 mi [24 km] west of El Palmito, black and white lights, 1 ♀, 18-VII-1964 (J. Chemsak & J. Powell, UCB); 8 mi [12.8 km] west of El Palmito, 6,000′, 1 ♀, 12-X-1975, at light (J. Powell, J. Chemsak, T. Eichlin & T. Friedlander, UCB).

Diagnosis.—The male genitalia of *Odonthalitus lacticus* are fairly divergent from other species in the genus. They can be distinguished by the widely concave distal 0.5 of the venter of the valva, the widely separate bases of the bifurcate uncus, and the relatively robust aedeagus (Fig. 20). The notch in the papillae anales of the female is similar to that of *O. viridimontis* and *O. paos,* but is much deeper.

Acknowledgments

I thank the following for allowing me to examine material in their care: Jerry Powell (UCB), Eugenie Phillips (INBio), Kevin Tuck (BMNH), and David Faulkner (SDNHM). I thank the following for reviewing the manuscript: Jerry Powell, University of California, Berkeley, California; Richard Brown, Mississippi State University, Mississippi State, Mississippi; William Miller, University of Minnesota, St. Paul, Minnesota; and F. Christian Thompson and David Smith, Systematic Entomology Laboratory, USDA, National Museum of Natural History, Washington, D.C. I thank J. Powell for providing me with the opportunity to conduct field work in Costa Rica and for comments on rearing attempts. The figures were skillfully rendered by Susan Escher (Figs. 2–5, 9–18, 20, 24), Front Royal, Virginia, and Linda Lawrence (Figs. 6–8, 21–23), USDA, Systematic Entomology Laboratory, Washington, D.C.

Literature Cited

Brown, J. W. 1990. Taxonomic distribution and phylogenetic significance of the male foreleg hairpencil in the Tortricinae (Lepidoptera: Tortricidae). Entomological News 101: 109–116.

Brown, J. W. and J. A. Powell. 1991. Systematics of the *Chrysoxena* group of genera (Lepidoptera: Tortricidae: Euliini). University of California Publications in Entomology 111. 87 pp.

———. 2000. Systematics of *Anopina* Obraztsov (Lepidoptera: Tortricidae). University of California Publications in Entomology. In press.

Horak, M. 1984. Assessment of taxonomically significant structures in Tortricinae (Lep., Tortricidae). Mitteilugen der Schweizerischem Entomologischen Gesellschaft 57: 3–64.

Lipscomb, D. 1994. Cladistic Analysis Using Hennig86, version 1.5. George Washington University, 122 pp.

Obraztsov, N. 1962. *Anopina,* a new genus in the Cnephasiini from the New World (Lepidoptera: Tortricidae). American Museum Novitates 2082: 1–39.

Powell, J. A., J. Razowski, and J. W. Brown. 1995. Tortricidae: Tortricinae, pp. 138–150. *In* Heppner, J. B., ed., Atlas of Neotropical Lepidoptera, Checklist: Part 2, Hyblaeoidea-Pyraloidea-Tortricoidea. Association for Tropical Lepidoptera. Scientific Publishers, Gainesville, FL.

Razowski, J. 1984. A list of the known Neotropical Tortricini moths (Lepidoptera, Tortricidae) with description of the first South American species. Revista Brasiliana Entomologica 28: 203–206.

———. 1992 [1990]. On some peculiar Neotropical tortricine genera (Lepidoptera: Tortricidae). SHILAP Revista de Lepidopterologia 18: 209–215.

———. 1993. Revision of *Apotoforma* Busck, 1934 (Lepidoptera: Tortricidae), with descriptions of four other Tortricini. Acta Zoologicae Cracoviensia 36: 183–197.

Walsingham, Lord T. de Grey. 1914. Biologia Centrali-Americana. Insecta, Lepidoptera Heterocera, Vol. 6. British Museum (Natural History), London. 482 pp.